

NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

**INCREASING THE UTILIZATION OF COMMERCIAL
ITEMS IN ACQUISITION PROGRAMS: PROBLEMS,
ISSUES AND BEST PRACTICES**

by

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December 2001

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**INCREASING THE UTILIZATION OF COMMERCIAL ITEMS IN
ACQUISITION PROGRAMS: PROBLEMS, ISSUES AND BEST PRACTICES**

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Submitted in partial fulfillment of the
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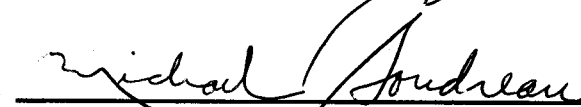
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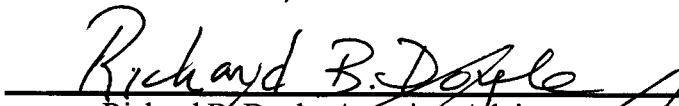
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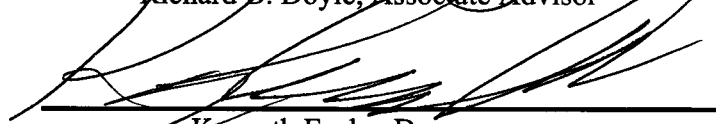
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ABSTRACT

Commercial and commercial off-the-shelf (COTS) describe products that have been developed primarily for the use of the commercial industries or for the general public. The theory behind using commercial items in DoD applications is that products developed for commercial usage will be competitively priced, and because of the large user base, will be very low in unit price as compared to a product designed and developed specifically for DOD's relatively low-volume usage. Also, in areas such as computers and software, commercial industry's speed of technology development and acquisition surpass that which the Government has been able to achieve.

As of January 2001, Under Secretary of Defense (Acquisition, Technology & Logistics) (USD(AT&L)), mandated an increase in the utilization of commercial items as follows: (1) double the dollar value of FAR Part 12 contract actions awarded in 1999 by the end of fiscal year 2005, and (2) strive to increase the number of FAR Part 12 contract actions awarded to 50 percent of all Government contracts awarded by the end of FY 2005. A great deal of study, writing and analysis has gone into the utilization of commercial item software products but less is known about the utilization of commercial item equipment, which this thesis will primarily address.

It is generally thought and accepted that the utilization of commercial equipment will substantially reduce cost and lead times necessary to get systems fielded. However, there may be some significant disadvantages to utilization of commercial items that should be recognized, analyzed and for which corrective actions should be planned to mitigate the implementation risks.

The objective of this thesis is to identify the critical PM and/or industry "issues" associated with integrating commercial items into a DoD acquisition program and to propose methods and process solutions that will alleviate many of the implementation problems and thereby mitigating the implementation risks.

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I. INTRODUCTION

A. PURPOSE

It is generally accepted that the utilization of commercial items will substantially reduce cost and lead times necessary to get systems fielded. However, there may be significant downsides and drawbacks to utilization of commercial items that should be recognized, analyzed and for which corrective actions should be planned to mitigate the implementation risks.

The purpose and objective of this thesis is to identify many of the Program Managers' (PM) or industries' critical "issues" associated with implementing and integrating commercial items into a DoD program. The researcher will also propose process solutions that may alleviate many of the problems and thereby help mitigate commercial item implementation risks.

B. SCOPE OF RESEARCH

The scope will include: (1) a review of DoD regulations as they relate to commercial items, (2) an in-depth review of the available commercial items literature, (3) a compilation and evaluation of adverse experiences by PMs and industries using commercial items from DoD audit reports and (4) an analysis of the audit results of the PMs and industry implementing current DoD's commercial item policies. The thesis will conclude with a recommendation of methods and processes that work effectively when utilizing commercial items in DoD programs.

C. RESEARCH METHODOLOGY

The data for this study was obtained from several sources. First, the researcher conducted an extensive review of available literature. This literature review consisted of a search of books, journal articles, microfiche, the worldwide web and other library information resources pertaining to commercial items. Finally, the researcher conducted a thorough review of the Internet for current DoD policies, regulations and audit reports relating to commercial item implementation.

Secondly, telephone interviews were conducted with major DoD acquisition agencies involved in the commercial item acquisition process. These agencies included

Under Secretary of Defense for Acquisition Logistics and Technology, USD(AL&T), Deputy Under Secretary of Defense for Acquisition Reform, DUSD(AR), Assistant Secretary of the Army for Acquisition Technology and Logistics, ASA(AT&L), and Headquarters Army Material Command, HQAMC, where it was determined that there was no current, consolidated, PM commercial item usage data available. Telephone interviews were also conducted with a small number of PM and industry personnel in order to identify current problems and issues being experienced with commercial item utilization.

Thirdly, a consolidated data call was obtained from Communication Electronics Command (CECOM), which contained issue papers from three Program Managers (PM): PM-Physical Security Equipment, (PM-PSE); PM-Defense Communications and Army Switched Systems, (PM-DCASS); and PM-Global Positioning System, (PM-GPS); and from the Competition Management Division Legal Office. [SMC]

Finally, additional data was obtained from General Accounting Office (GAO), Army Audit Agency (AAA), and Department of Defense Inspector General (DoD IG) audit reports.

D. RESEARCH QUESTIONS

To achieve the objectives of this study, the primary research question was as follows:

What are the most important problems and solutions associated with the use of commercial products within defense acquisition?

From the basic research question, the following subsidiary questions were developed:

1. What is the definition of commercial items and their relevance to DoD?
2. What are DoD's requirements and objectives regarding commercial item usage?
3. What are the critical problems or issues confronted by PMs utilizing commercial items?
4. How can PM problems or issues utilizing commercial items be resolved?

E. ORGANIZATION OF STUDY

The researcher will first review the background of commercial items and the DoD commercial item requirements in some detail in Chapter II. In Chapter III, the Program Managers' and industries' experiences utilizing commercial products within their DoD programs will be identified and categorized for further study. In Chapter IV, the PM and industry critical problems and issues are analyzed. In Chapter V, potential process solutions will identify the best practices and conclude with areas for further research.

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II. BACKGROUND

A. COMMERCIAL ITEMS DEFINED

The Federal Acquisition Regulation (FAR) defines the terms “commercial item” and “nondevelopmental item” as follows:

1. Commercial Item

- a. Any item, other than real property, that is of a type customarily used for nongovernmental purposes and that has been sold, leased, or licensed to the general public, or has been offered for sale, lease or license to the general public.
- b. Any item that evolved from an item described in paragraph a, above through advances in technology or performance that is not yet available in the commercial market in time to meet the delivery requirements of the solicitation; but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation.
- c. Any item that, but for modifications of a type customarily available in the commercial market or minor modifications made to meet DoD requirements, would satisfy the criteria in paragraph a or b, above, etc.
[FAR Part 2]

2. Nondevelopmental Item

Any previously developed item used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the U.S. has a mutual defense cooperation agreement.
[FAR Part 2]

Because the specific emphasis within DoD is to increase the utilization of commercial items, and nondevelopmental items (NDI) are placed second in the priority of implementation, this thesis will only address commercial item usage. NDI literature will be reviewed inasmuch as problems experienced utilizing NDI, will for the most part, apply to commercial item usage as well. Also, there is a great deal of indiscriminate and imprecise terminology usage. Thus, when the term “NDI” is used, the literature may

actually be referring to a commercial item. The specific study of nondevelopmental items will be excluded from this study, but many of the problems and issues found when utilizing commercial items also apply when using nondevelopmental items. Thus, the same types of precautionary and risk-reducing tactics as recommended in this thesis for commercial items may be used when acquiring nondevelopmental items.

Government Off-The-Shelf (GOTS) is also a commonly used term for nondevelopmental items (NDI) that are government-unique items in use by federal, state or other governmental agency or by a foreign government with which the United States has a mutual defense cooperation agreement. This area will also be excluded and this term will not be utilized in this thesis.

Commercial Off-The-Shelf (COTS) is a familiar and well-used term within industry and DoD. However, there is no definition of COTS in the FAR Part 2. As used, COTS is traditionally defined as its name implies, i.e., a commercial item that is purchased off the commercial shelf without any modification whatsoever. This term will not be used in this thesis except where quoted, in favor of the broader term Commercial Item that includes COTS as a subset.

B. BROADENED DEFINITION OF COMMERCIAL ITEMS

The Federal Acquisition Streamlining Act (FASA) of 1994 and the Federal Acquisition Reform Act (FARA) of 1996 broadened the definition of a commercial item. As they redefined it, systems, subsystems, and components other than real property are considered commercial items or modified commercial items if they are of a type that can be categorized into one of the following areas:

1. Has been offered for sale, sold, leased, or licensed to the general public.
2. Evolved through technology or performance advances and will be available in the commercial marketplace in time to meet proposed Government delivery requirements.
3. Required modification of a type customarily available in the commercial marketplace or required minor modification of a type not customarily available in the commercial marketplace to meet DoD requirements.

Besides broadening the definition of commercial items, the 1994 FASA and 1996 FARA Acts enabled DoD to revise and modify acquisition regulations. DoD was in a position to:

1. Simplify contracting procedures for acquisitions not costing more than \$5 million, when contracting officers reasonably believe that only commercial items will be offered;
2. Exempt the contract requirement to provide cost or pricing data for commercial items;
3. Give contracting officers flexibility in determining price reasonableness for contracts, subcontracts, and modifications;
4. Provide contracting officers a list of Federal Acquisition Regulation (FAR) provisions that are not applicable for commercially available items; and
5. Remove more than 30 contractor certification requirements that are not specifically imposed by statute.

[FARA, FASA]

C. COMMERCIAL ITEMS CLARIFIED

On January 5, 2001, Dr. J. S. Gansler, then Under Secretary of Defense for Acquisition, Technology and Logistics, issued a policy memorandum to clarify and to help overcome some of the barriers being experienced within the Department of Defense in utilizing commercial items. An Integrated Process Team (IPT) had been formed at his direction and was headed by both the Deputy Under Secretary of Defense for Acquisition Reform (DUSD (AR)) and the Director of Defense Procurement. The IPT was chartered to review DoD commercial item determinations and evaluate whether additional guidance, tools, or training were necessary. Dr. Gansler's memorandum says that the IPT found "inconsistent commercial item determination and weak market research among the obstacles that exist to broadening the use of commercial items within the DoD." [DoD. USD(AT&L), 5 January 2001]

Dr. Gansler's memorandum also provided clarifying definitions of FAR Part 12 for greater consistency within DoD. Three of the most important of these are as follows:

Commercial Off-the-Shelf (COTS): A product does not have to be commercial-off-the-shelf (COTS) to meet the "commercial item"

definition. COTS items are a subset of commercial items. The commercial item definition is much broader than products that are presently available off-the-shelf. It includes items that have only been “offered” for sale, lease, or license to the general public, as well as those that have evolved from a commercial item and are offered for sale, even if not yet available in the commercial marketplace. However, evolved items must be available in the commercial marketplace in time to satisfy solicitation delivery requirements. In addition, all other elements of the commercial item definition at FAR 2.101 must also be met.

Modified Commercial Items: When items available in the commercial market cannot meet the Department’s need, DoD must determine whether market items can be or have been modified so that FAR Part 12 can be used. Two types of modifications are available: (1) modifications of a type available in the commercial marketplace; and, (2) minor modifications of a type not customarily available in the commercial marketplace made to Federal Government requirements. For modifications of a type available in the commercial marketplace, the size or extent of modifications is unimportant. For minor modifications, the item must retain a predominance of nongovernmental functions or physical characteristics.

“Of a Type”: The phrase “of a type” is not intended to allow the use of FAR Part 12 to acquire sole-source, military unique items that are not closely related to items already in the marketplace. Instead, “of a type” broadens the commercial item definition so that qualifying items do not have to be identical to those in the commercial marketplace. The best value offer in a competitive Part 12 solicitation can be an item that has previously satisfied the Government’s need but has not been sold, leased, licensed, nor offered for sale, lease or license to the general public (a nondevelopmental item as defined in 10 USC 403 (13)). In this scenario, the phrase “of a type” allows the best value offer to qualify for a Part 12 contract as long as it is sufficiently like similar items that meet the government’s requirement and are sold, leased, licensed, or offered for sale, lease or license to the general public. In such instances, “of a type” broadens the statutory commercial item definition to allow Part 12 acquisition of a government-unique item that can compete with commercial items that meet the government’s requirement. This avoids the undesirable result of shutting out otherwise price-competitive preexisting suppliers of government-unique items from Part 12 solicitations.

[DoD. USD(AT&L), 5 January 2001]

Since COTS has been defined as a subset of “commercial items” and Dr. Gansler’s memorandum specifically addresses the broader scope of commercial items,

this researcher will use the term “commercial item(s)” throughout this thesis and the term commercial off-the-shelf (COTS) will not be used.

A memorandum titled Commercial Acquisitions, dated 26 March 2001, was issued by the Acting Assistant Secretary of the Army for Acquisition, Logistics & Technology, incorporating a plan titled, “*Implementation Plan for Increasing the Use of FAR Part 12*”. The plan announced a policy that all contractually provided services (with the exception of services under FAR Part 36) were presumed to be commercial and that FAR Part 12 policies and procedures would be used to buy those services. The plan further states, “For those services where the results of market research indicate that the service is not commercial, the local Competition Advocate must approve the commercial determination.” (ASAAL&T) This plan puts even more emphasis on the utilization of commercial items within the Army, which may open the way for all DoD.

D. DOD REGULATION 5000.1: COMMERCIAL ITEM REQUIREMENT

Government regulation echoes the statutory preference for commercial items and indicates their importance to DoD. The best evidence of this is DoDR 5000.1, as noted below.

In response to user requirements, priority consideration shall always be given to the most cost-effective solution over the system’s life cycle. In general, decision-makers, users, and program managers shall first consider the procurement of commercially available products, services, and technologies, or the development of dual-use technologies, to satisfy user requirements, and shall work together to modify requirements, whenever feasible, to facilitate such procurements. Market research and analysis shall be conducted to determine the availability, suitability, operational supportability, interoperability, and ease of integration of existing commercial technologies and products and of non-developmental items prior to the commencement of a development effort.

[DoD Directive 5000.1, paragraph 4.2.3]

E. MARKET RESEARCH

Market research is the process of collecting and analyzing data about the products and technologies available in the marketplace. The market research IPT then determines which product or technology satisfies the agencies procurement needs. Market research has been a statutory requirement for almost 20 years, since the passage of the Competition in Contracting Act of 1984. This act requires the use of market research and

procurement planning to promote the use of competitive procedures in federal contracting.

In November 1990, Congress reemphasized market research for the DoD in the National Defense Authorization Act for Fiscal Year 1991 (P.L. 101-510). The goal of this act was to encourage DoD to save money and reduce acquisition cycle time by buying products that were commercially available or had already been developed.

The Federal Acquisition Streamlining Act (FASA) of 1994 stipulated that all federal executive agencies must conduct market research before developing new specifications for procurement or soliciting bids for contracts exceeding \$100,000. FASA (Section 8104, paragraph 2377 of Public Law 103-355) requires heads of agencies to use the results of market research to determine whether there are commercial items available that meet the agency's requirements, if those requirements were modified to a reasonable extent. For example, if a requirement specifies that an aircraft must meet a maximum speed of 100 mph but there is a commercial item available with maximum speed of 90 mph, the requirements community must seriously consider reducing that requirement so that the commercial item can be used. If suitable commercial items are not available, the agency will then use nondevelopmental items.

The FAR implemented those market research provisions and essentially established market research as a tool for identifying sources to ensure competition as well as commercial products to meet an agency's needs. FAR Part 10 requires that agencies conduct market research appropriate to the circumstances before developing new acquisition requirements documents. If market research establishes that a commercial item cannot fill the Government's need, agencies are required by FAR 10.002(c) to reevaluate the requirement for possible restatement to enable use of commercial or nondevelopmental items, as defined in FAR 2.101. The findings of market research must be documented per FAR 10.002 (e).

F. COMMERCIAL ITEM USAGE CONCEPT

The concept behind greatly expanding the usage of commercial items in DoD applications is best explained in a study produced by the USD(AT&L), as follows:

Expanding the use of commercial items in Department of Defense (DoD) systems offers the DoD opportunities for reduced cycle time, faster insertion of new technology, lower life cycle costs, greater reliability and availability, and support from a more robust industrial base.

[DoD. ODUSD(AR), 14 July 2000]

Because of the competitive pressures experienced by commercial manufactures to remain in business, they are forced to develop and produce the best possible quality products at the most competitive cost. DoD, therefore, will reap the benefits and get the best value without expending the time and funds necessary to develop, test and field a similar product. Also, in areas such as computers and software, the speed of technological development and acquisition by commercial industry surpasses that which the Government has been able to achieve. Therefore, commercial items will save the DoD both time and money, as well as keeping them technologically competitive.

Clearly, the mandate of the USD(AT&L) is for DoD to dramatically increase the utilization of commercial items to improve the acquisition process by speeding it up, reducing costs, and keeping pace with commercial technology development. As the USD(AT&L) memorandum says:

To the maximum extent possible, commercial acquisitions should be conducted using FAR Part 12. The use of FAR Part 12 is designed to provide the Department of Defense (DoD) with greater access to commercial markets with increased competition, better prices, and new market entrants and/or technologies.

[DoD. USD(AT&L), 5 January 2001]

G. DOD COMMERCIAL ITEM REQUIREMENTS

USD(AT&L's) memorandum of January 5, 2001 provided further specific commercial item acquisition dollar-value goals for DoD to meet. The two most important of these are quoted as follows:

1. Each Service and Defense Agency should double the dollar value of FAR Part 12 contract actions awarded in 1999 by the end of fiscal year (FY) 2005. This would bring the DoD total FAR Part 12 contract actions from \$12.6 billion to \$25.2 billion.*

2. Each Service and Defense Agency should strive to increase the number of FAR Part 12 contract actions awarded to 50 percent of all Government contract awarded by the end of FY 2005.*

*For purposes of these goals, a contract action is defined as any new contract award and/or new delivery order placed against a contract awarded with a value greater than \$25,000.

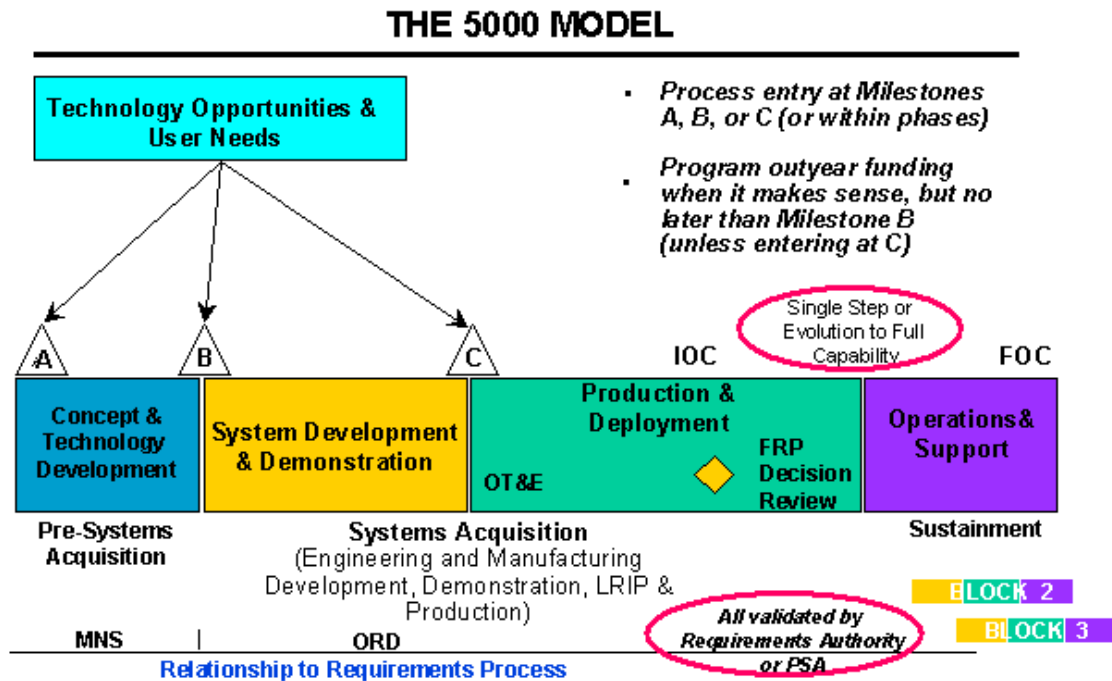
[DoD. USD(AT&L), 5 January 2001]

In support of these objectives, Dr. Gansler's memorandum tasked the DUSD(AR) to track the Department of Defense progress in meeting these goals. He also requested that the DUSD(AR) and the Director of Defense Procurement charter an Integrated Process Team (IPT) to: "determine the feasibility of establishing a pilot program so that the Services and Agencies may collect market research and Commercial Item Determinations in a central database, or developing tools to assist in ensuring commercial item determinations are reasonably consistent." [DoD. USD(ATL), 5 January 2001]

It is clear that it is DoD policy to strongly encourage the utilization of commercial items in the DoD acquisition process. In support of using commercial items and in order to shorten the time it takes to complete an acquisition, the process of trading user "gold plated" requirements for commercial items is an option that must be strongly considered. However, any such tradeoffs must be critically examined in order that real user needs, necessary to meet emerging threats, are not sacrificed for the commercial item goal.

H. USING COMMERCIAL ITEMS

The use of commercial items in DoD is not new; many programs have used commercial items to some extent. For example, a vehicle program might use commercial tires and batteries, with everything else developed especially for the Government program. Or a complete program, such as a truck, might be a slightly modified commercial item. The extent of commercial item usage varies from program to program. With the new emphasis on using commercial items within DoD, a new paradigm of system acquisition thinking is being created. The 2001 system acquisition management process graphic representation from DoDI 5000.2 is shown in Figure 1.



**Figure 1. Defense Acquisition Management Framework
(From: DoDI 5000.2)**

The model process is separated into three segments: pre-systems acquisition, systems acquisition, and sustainment. This process is then broken down contextually, by OSD, into the Traditional Model, as shown in Figure 2. The Traditional Model consists of three segments as follows: 1) *System Context*, which includes the requirements definition and concept exploration phases of systems acquisition, 2) *Architecture & Design*, which includes the design & development phase of systems acquisition, and 3) *Implementation*, which includes the building, fielding and supporting phases of the acquisition system. This Traditional Model is then transposed into the Recommended Model, which overlaps the three areas above and overlays the process of *Simultaneous Definition and Tradeoffs* as the new paradigm for increased utilization of commercial items within DoD programs. As the OSD says, “increased reliance on commercial items implies a different paradigm of systems acquisition.” [DoD. ODUSD(AR), pg 3, 14 July 2000]

The greatest difference between the two models shown in Figure 2 is that greater interaction is required between the system context, architecture and design segments

when using commercial items, as shown by the overlapping of contextual areas. This new model indicates that there is a greater need for use of Integrated Product/Process Development (IPPD) and IPTs as the overlapping areas indicate. As the OSD states: “Managing this interaction requires unprecedented cooperation among the program office, the stakeholders, the contractor, and in many cases the vendor in order to effect the tradeoffs necessary to keep the program on track.” [DoD. ODUSD(AR), pg 3, 14 July 2000]

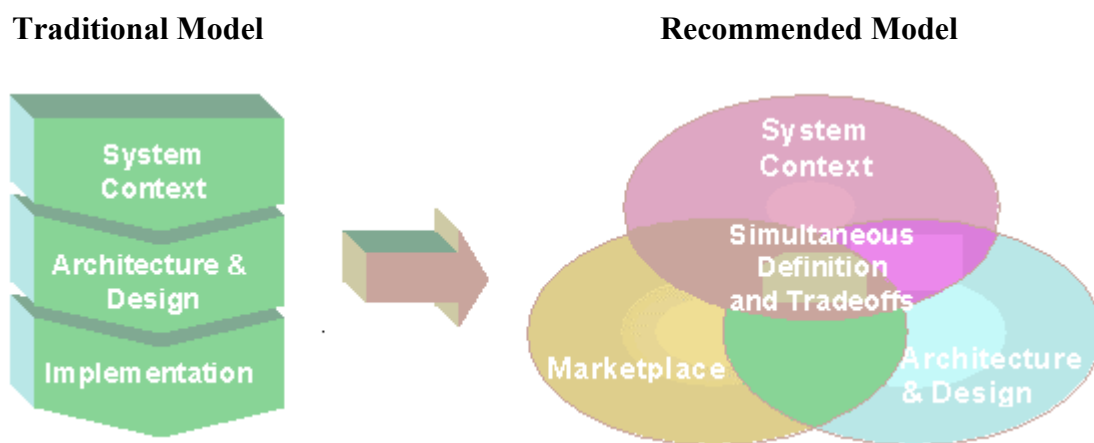


Figure 2. Traditional Model vs. Recommended Model
(From: ODUSD(AR), pg 3, 7/14/2000)

PMs must not only manage a traditional system but now must also integrate the selection of commercial items in varying degrees into their program, along with all of the problems associated with commercial item usage. Many acquisition programs have had problems or have failed due to a lack of consideration for the uniqueness of commercial item usage in their programs, as well as inattention to the differences noted below.

Some of the most important new paradigm considerations and issues a PM must deal with are as follows:

1. The marketplace, not the PM, drives development of the commercial product.

The commercial marketplace is driven by customer demand, customer satisfaction and competition. Because DoD's demand for commercial products is such a small portion of total commercial demand, DoD cannot dictate development to commercial producers. Using software as an example, it is noted that, "DoD accounts for less than 1% of the U.S. market, and less than 0.6% of the international market." [Anderson, pg. 4, 1998]

2. A change of the commercial product (which is almost a certainty) will drastically affect program supportability.

Change is the norm in the commercial item marketplace, and must be carefully planned for by PMs when using commercial items in their programs. Planning for program supportability over the expected life cycle of the product is critical. A method for handling obsolescence should be devised, such as preplanning product improvement or upgrading commercial items with new technology insertion along with retirement of the obsolete items. Another method cited by ODUSD(AR) was "by adopting an open system architecture with modular designs, maintaining close relationships with commercial item vendors, and monitoring the marketplace, one particularly successful program not only avoided technological obsolescence, but also developed a "sparing" model that reduced the cost of spare components by 40%." [DoD. ODUSD(AR), pg. 17, 14 July 2000]

3. Integrating a commercial item into a program is fundamentally different from developing a custom product, and may require similar PM attention.

In the development of a custom product, the PM dictates the behavior of components and interfaces among components. However, as ODUSD(AR) indicates, "Program managers who use commercial items have little insight into how the commercial items are put together, how they behave, and why." [DoD. ODUSD(AR), pg. 5, 14 July 2000]

4. Greater teamwork among stakeholders during the selection of commercial items from the marketplace is essential to keep the program on track.

There is a dynamic interaction necessary between stakeholders when using commercial items in order to adequately perform commercial item market research,

determination and, if necessary, modification of user requirements, establishment of commercial item logistic support requirements and determination of system reliability. As ODUSD(AR) states, “Managing this interaction requires unprecedented cooperation among the program office, the stakeholders, the contractor, and in many cases the vendor in order to effect the tradeoffs necessary to keep the program on track.” [DoD. ODUSD(AR), pg. 3, 14 July 2000]

5. There must be a willingness to adapt the “requirements” to the capabilities available in the marketplace rather than adapting the commercial capabilities to the DoD “requirements.”

Paring down requirements to those absolutely essential to the program, as opposed to those “nice to have,” will allow for requirements flexibility to enable choosing an acceptable commercial item.

ODUSD(AR) notes that, “Requirements specification must be flexible and negotiable. A traditional development model that specifies all system requirements prior to considering the capabilities available in the marketplace is ill suited to the development of systems incorporating commercial items.” [DoD. ODUSD(AR), pg. 8, 14 July 2000]

6. Commercial item usage means that many of the normal acquisition activities (such as system development and sustainment) will be repeated throughout the lifecycle of the program, because a commercial item is never really complete (i.e., it is always changing).

Frequent change in the commercial item’s configuration will mean constant monitoring of the impact to the program, as indicated by ODUSD(AR): “However, new, changed, and obsolete commercial items necessitate repeated cycles of requirement definition, commercial item evaluation, and system engineering. Some form of replanning and reengineering will be ongoing throughout the life of the system.” [DoD. ODUSD(AR), pg. 5, 14 July 2000]

7. The product must be tested or verified to ensure that required capabilities are in fact met as promised by the commercial item manufacturer.

A commercial item’s capability may not always be as stated, and should always be verified. As noted by ODUSD(AR), “Another program that was using multiple

commercial items found that even basic, advertised capabilities of commercial items had to be tested before the program could begin its planned integration testing.” [DoD. ODUSD(AR), pg. 18, 14 July 2000]

I. POTENTIAL BENEFITS OF USING COMMERCIAL ITEMS

There are unique obstacles when using commercial items. However, when addressed correctly, the benefits can far outweigh the risks. Programs have documented great savings of time and money when the unique challenges encountered by the use of commercial items have been adequately addressed. However, the use of commercial items does not reduce or eliminate the risks associated with the traditional acquisition processes. It is critical that the overall system be guided through all the traditional acquisition processes of engineering, development, integration, testing, delivery and sustainment, and that each program be well managed. As the ODUSD(AR) states, “While there are significant benefits, these benefits can be attained only by understanding and addressing the significant new challenges that are driven by the fundamental differences between building items and buying them.” [DoD. ODUSD(AR), pg. 20, 14 July 2000]

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III. PM & INDUSTRY COMMERCIAL ITEM USAGE EXPERIENCE & PROBLEMS

A. INTRODUCTION

This chapter will document many of the PM and industry “issues” associated with implementing and integrating commercial items into a DoD program. These issues come from several sources, such as the Army Audit Agency, General Accounting Office (GAO), DoD Inspector General (DoD IG), and data from a CECOM PM.

Issues will be presented by audit agency report or issue paper topic and then segregated, when applicable, into the acquisition topic areas as follows: needs determination; acquisition strategy; market investigation; concept formulation; risk analysis; management of integration; test and evaluation; logistics support, including reliability; support requirements; and technical data for competitive repurchase.

B. BACKGROUND INFORMATION

In many of the referenced Army documents that follow, the term “nondevelopmental item” is used synonymously with the term “commercial item” as previously defined in this thesis. Where the term, “nondevelopmental item” is used in the documentation, it will be replaced with “commercial item” throughout this portion of the research, except when “nondevelopmental item” is used in a quotation.

Since understanding the issues presented herein requires some understanding of the acquisition process areas discussed, basic definitions are provided below for each of the following concepts: requirements determination; acquisition strategy; market investigation; concept formulation; management of integration; test and evaluation; and logistics support, which includes: reliability, support requirements, and technical data for competitive repurchase.

1. Acquisition Strategy

All major material acquisition programs require an acquisition strategy. In the Army, for example, the material developer prepares the acquisition strategy during the concept exploration phase, prior to being approved at the milestone I/A decision point.

The acquisition strategy documents the approach for satisfying a requirement that includes plans and justifications for streamlining the acquisition process - that is, plans to shorten or eliminate any of the acquisition phases. The goal of the material developer is to tailor the strategy to create the shortest path through the acquisition process that will successfully satisfy the material requirement.

If the acquisition strategy is not accurately identified early in the process, incorrect phases of the acquisition process will be applied to one of the following: the system, the part, the component, or to the integration of all these into a system. Any streamlining that occurs which eliminates acquisition phases or steps in the commercial item acquisition process must be fully addressed in the acquisition strategy. The treatment of basic low-risk, off-the-shelf commercial items as medium or high-risk commercial items will add unnecessary delay and cost to the project. Likewise, if high or medium-risk projects are categorized and treated incorrectly, they will not be processed correctly. Potentially, additional cost and time will be incurred because these projects have not been tested and evaluated properly, or had other program risks that have not been properly addressed. Acquisition strategies should also be updated and resubmitted promptly when conditions change significantly. This will allow decision-makers to properly assess the impact of such changes. Users of the items should be involved early in the acquisition process in order to fully understand the nature, potential limitations, and advantages of commercial and nondevelopmental items. Only in this way can the user and acquisition community maintain the flexibility that is needed in establishing requirements to make effective use of commercial items and nondevelopmental items in their programs.

2. Market Investigations

Current DoD policy encourages the use of commercial products. However, procurement agencies have the burden of determining whether commercial items are available. This process is called market research.

Market research consists of two related techniques: market surveillance and market investigation. Market surveillance is used to maintain a current knowledge of market availability within a particular area of technical expertise. Market investigations

evaluate commercial items in the marketplace to determine whether they can meet specific military requirements, or whether a new acquisition development project should be initiated.

Market research is defined in more detail in chapter II, paragraph E, of this thesis. Market investigations should satisfy three criteria as follows: (1) identify all potential commercial item or nondevelopmental item sources (which includes other military services, other governmental agencies and allied countries), (2) be coordinated with independent evaluation activities, and (3) obtain enough actual test and performance data, if applicable, to assess critical issues relating to the operational suitability of the commercial or nondevelopmental item.

3. Concept Formulation

The materiel developers (U.S. Army Materiel Command) and the combat developers (U.S. Army Training and Doctrine Command) jointly prepare the concept formulation package in the Army acquisition process. The concept package includes a tradeoff determination and a best technical approach, which are prepared by the material developers. It also includes an Analysis of Alternatives, which is completed by the combat developers. The concept formulation process provides the initial up-front and early data for defining and approving the material requirements documents and supporting program decisions, including analysis of acquisition strategies. A joint process is used to ensure that the material requirements are realistic, affordable and analytically supported. These analyses, along with the market investigation, form the basis for development of a sound acquisition strategy and formal requirements document.

4. Management of Integration

Integration projects - that is, projects that may use commercial items but have to integrate components or systems to work together - can be high-risk, complex and costly acquisition efforts and therefore must be managed appropriately. If integration projects are not identified properly, there will be high risk of a program experiencing technical problems and not meeting user requirements. Integration projects usually present the greatest challenges and are among the highest risk programs that utilize commercial

items. The adverse results could impact costs and schedules as well as not meeting user requirements, resulting in potential mission failure.

5. Logistics Support

Logistics support planning is a process that should commence early in a new acquisition program. The goal is to influence material system requirements and design in order to ensure that the system has optimum reliability and life cycle costs (LCC) - in other words, maximum reliability and minimum life cycle costs. Poor logistics support planning could result in inadequate logistics support, which in turn could adversely affect the system's readiness and cost.

a. Reliability

Reliability is defined as the "probability that, when operating under stated conditions, the system or component will perform its intended function adequately for a specified period of time." [Air Force Space and Missile Command, pg. 1, 14 August 1998]

In programs involving R&D, a major issue that developers must consider is system reliability. Reliability, availability, and maintainability (RAM) are key LCC drivers. RAM must be addressed early in the acquisition process by establishing reliability requirements that determine whether the system is economically supportable over its entire life cycle and is able to achieve required readiness levels.

If the reliability of a commercial item is not verified as being able to meet the user's requirements, then the system's LCC and readiness will be severely impacted. Lower reliability greatly impacts the support costs, system availability and thus, mission accomplishment. RAM requirements must be established early in order to enable the adequate testing of commercial items or nondevelopmental items. Quantitative reliability, availability and maintainability requirements should be established for all commercial items, with the exception of passive commercial items with no identifiable failures.

b. Support Requirements

Support requirements have to do with the way the system is maintained. It can be supported by either a contractor supply and maintenance system or a military

organic (in-house) supply and maintenance system. Contractor or organic support requirements must be analyzed via cost-benefit analysis methodology in order to justify the selected support decision. Support requirements specifically address how commercial items will be maintained and supported when fielded due to the fact that Government access to commercial item technical data will most likely be limited. Consequently, availability of supplied parts may cease before the intended military lifecycles of the items expire. Support requirements analysis is crucial, since military systems are kept in the operational inventory far longer than the lifespan of most commercial items.

c. Technical Data for Competitive Reprocurement

Technical data comes in many forms, including technical maintenance and operating manuals, engineering drawings and specifications, repair parts lists, and special tool lists, to name a few. All acquisition programs require technical data to some degree for logistics support of the system. The data that is acquired for a new program should be tailored to the specific and well planned needs of the program. Generally, the need for technical data to support reprocurement decisions should be made via economic analysis, which will indicate the best overall strategy for obtaining spare parts or replacement systems. As previously mentioned, Government access to commercial item or nondevelopmental item technical data will most likely be limited, and availability of parts supplied may cease before the intended military lifecycles of the items expire. An analysis of the program's future requirements for technical data is essential, since military systems are kept in the operational inventory far longer than the lifespan of most commercial items. Thus, there must be some provisions made for the supply of spare parts after the commercial items have become obsolete in the commercial marketplace.

6. Test and Evaluation

The purposes of test and evaluation in the development of a defense system and its acquisition process are the following: to determine the feasibility of conceptual approaches in order to minimize design risk, to identify design alternatives, compare and analyze tradeoffs, and to estimate operational effectiveness and suitability. As a system progresses through design and development, the emphasis in testing moves gradually from development test and evaluation (DT&E) - which is chiefly concerned with the

attainment of engineering design goals - to operational test and evaluation (OT&E), which focuses on questions of operational effectiveness, suitability, and supportability.

DT&E is normally planned and conducted by the developing agency during the concept and technology development phase to assist in the selection of the preferred alternative system concepts, technologies, and designs. During the system development and demonstration phase, DT&E demonstrates that engineering is reasonably complete, that all significant design problems are in hand, and that the design meets its required specifications in all areas, such as performance, reliability, and maintainability.

The purpose of OT&E is to verify that only operationally effective and operationally suitable systems are approved for production, thereby meeting both mission needs and the minimum operational performance requirements of the user. For major systems, OT&E is normally planned and conducted by a major OT&E field agency located within the DoD component. This operational test agency must be separate and independent from the developing/procuring agency.

Operational testing is the primary means of evaluating system performance in a combat representative environment. It is structured to determine the operational effectiveness and suitability of a system, as well as to determine if the minimum acceptable operational performance requirements have been satisfied.

Operational effectiveness refers to the ability of a system to accomplish its mission in the planned operational environment. Suitability is the degree to which a system can be placed satisfactorily in field use, taking into account such factors as the system's reliability and maintainability. [DSMC, January 1990]

In the commercial arena, commercial items may already have test data available; however, unless the data has been verified by an independent evaluator it should not be accepted.

In all usage of commercial items in major programs, OT must be performed in order to verify or establish the system's performance in the representative operational wartime environment.

7. Culture

It has been found that culture plays a key role in many negative decisions that are made in the acquisition community. As used here, culture can be defined as the background, mores, traditions and customs, or way of life of a group.

In the acquisition arena, there are many key players and contributors to the PM's mores, traditions, and way of life. Some of the key players are the military chain-of-command, the Congressional and military budgeters, the program's contractor, the Government contracting agency, the program decision authority, the user community, and the test community, all with needs that may diverge and actually threaten program success.

For example, there are Congressional budget "rewards" that force a PM to do everything within his power to see that his program doesn't fail a test. If he fails a test, he may not have a program, because his program funding will be cut. Therefore, he doesn't have a keen interest in failing as many times as is necessary to adequately "learn" from a developmental test. Maturing the technology through the test-fix-test process would ensure that his program will not have later technological setbacks that would in turn drive schedule and cost overruns, as well as increasing life-cycle support costs of the program. Nor does the PM welcome the tester, when he says, "I'm here to help you." The culture and reward system by which the PM lives dictates a different response. As testimony to this, a GAO study found that the processes and culture within DoD have contributed to a feeling of great aversion by PMs, both towards the test community as well as towards the testing of the PMs' weapon systems. The GAO states the following:

Testing plays a less constructive role in DoD because a failure in a key test can jeopardize program support. Specifically, test results often become directly linked to funding and other key decisions for programs. Such a role creates a more adversarial relationship between testers and program managers. [GAO, pg. 6, 31 July 2000]

The negative cultural pressures on a PM are further exemplified by an article in the Marine Corps Times, titled, “We Need to Lie -- To Save the Osprey, Squadron Boss Ordered Marines to Fake Records.” [Brinkley, pg.8, 29 January 2001] This article alludes to the negative cultural pressures as perceived by the Marine PM, Lt. COL. Odin F. Liberman that forced him to lie to protect his program. The article was based upon an anonymous letter and audiotape received by the administrative offices of Navy Secretary Richard Danzig. The article quotes the barely audible audiotape of a voice identified as Liberman’s that states,

The reason we need to lie is ... [to] manipulate the data until Milestone III when the aircraft passes its final evaluation and enters full rate production, this program is in jeopardy ... Everybody says readiness is in bad ... It’s something that everybody is focused upon.

[Brinkley, pgs 8 & 10, 29 January 2001]

8. Army Definitions

During the time of the Army audits cited below, the definition of the various classifications of what was known then as nondevelopmental items (which would be classified now as commercial items), is quoted as follows:

- **Basic.** These are off-the-shelf items used in the same environment for which they were designed. The items should not require development or modification to be acceptable. Available information (such as test data, technical publications and reliability data) should be obtained from the item source and evaluated to avoid costly duplication of effort.
- **Adaptation.** These are off-the-shelf items adapted for use in a different environment that they were designed for. The items require some modification for military use. Test and evaluation usually is required to ensure the modified items meet user requirements.
- **Integration.** These are nondevelopmental items used as subsystems or components of larger systems. The efforts require a prove-out phase involving systems engineering and test and evaluation to make sure the total system meets user requirements and is producible.

[USAAA, pg. 8, 19 March 1990]

C. COMMERCIAL ITEM USAGE ISSUES

Issues will be presented by audit agency report or issue paper topic and then segregated into such areas as needs determination, acquisition strategy, market investigation, concept formulation, design, risk analysis, management of integration, test and evaluation, and logistics support. Logistics support will be further divided into the following areas: reliability, support requirements, and technical data for competitive reprourement.

1. U.S. Army Audit Agency, NE 90-206, Acquisition of Nondevelopmental Items: U.S. Army Natick Research, Developmental and Engineering Center, Natick, Massachusetts. 19 March 1990

This audit reports that the Army often based acquisition strategies on incomplete information due to the fact that the Army did not properly conduct market investigations and concept formulation analysis.

Some of the Army Audit Agency specific findings were as follows: “One system ... involved system integration, but went from program initiation to production without sufficient testing.” [Pg 2] This resulted in an Army worldwide modular print system being purchased without sufficient required testing, which would have ensured that the system met Army requirements. “Planned maintenance concept for an automatic reserve parachute ripcord release was inconsistent with requirements documents, and ... did not tell decision makers the true cost or extent of required overhauls.” [pg. 2]

a. Acquisition Strategy

The Army Audit Agency reviewed 15 of 22 commercial item projects, and found that 14 of the 15 projects did not identify the Army identification category of commercial item (i.e., basic off-the-shelf, adaptation or integration item). For 10 of these projects, the strategy was inconsistent with the type of category of commercial item being acquired. For example, basic off-the-shelf items were managed as adaptation projects. In turn, adaptation and integration items were managed as other types of projects. For basic, low-risk, off-the-shelf projects, this added unnecessary delay. In addition, complex, high-risk integration projects that should have been rigorously tested and evaluated were instead rushed into production as if they had been off-the-shelf projects. For example, as

the Army Audit Agency states “One system -- the Modular Print System -- involved system integration, but went from program initiation to production without sufficient testing.” [pg. 2] This project was actually a complex system integration effort involving risks.

These problems resulted from the erroneous supposition that by eliminating the necessary required analysis developers would be able to streamline the acquisition process. As the Army Audit Agency report says, “Natick Center personnel did not appear to fully understand the various categories of commercial items and did not believe the category was important.” [pg. 11]

b. Market Investigations

The Army Audit Agency found that market investigations either were not conducted at all, or were inadequate for most of the commercial item projects. Army Audit Agency reviewed 15 of 22 commercial item projects, and found that five market investigations were not documented. Furthermore, for seven of the projects, the market investigations were neither complete, nor had been coordinated with the independent evaluators as required. The Natick RD&E Center’s policy at the time was to leave market investigations incomplete or undocumented in order to streamline the acquisition process, thereby saving time. However, without properly conducted market investigations, managers had little assurance that all the possible alternatives or material sources had been identified, investigated, and that the best alternative had been selected. The Army Audit Agency said, “Natick Center often did not properly conduct market investigations and other required analyses to develop sound acquisition strategies for nondevelopmental items.” [pg. 2]

For example, both snow and ice-traversing equipment and a field pack project experienced costly problems by not having a market investigation completed. In the case of the snow and ice-traversing equipment, if a proper market investigation had been performed, the problems with the selected off-the-shelf items could have been recognized and evaluated prior to acquiring and testing them. In the case of the field pack, a market investigation would have identified the deficiencies with the commercial

pack, which required modification to such an extent that it bore no resemblance to the original commercial pack.

c. Concept Formulation

The research center had not prepared concept formulation packages for any of the 15 projects reviewed, resulting in many questionable decisions. For example, the Army developed a saltwater purification device at a cost of \$250,000 and a purchase cost of \$1,320 each, when there was already a Navy-developed system available for a purchase cost of \$980 each. A proper concept formulation package would have identified the Navy system as a possible alternative. A tradeoff analysis between cost and differing requirements could have resulted in selection of the Navy system as an alternative, thus saving the Army \$250,000 in development costs as well as the extra \$340 purchase cost per system. This selection would also have saved the Army the two years of developmental time needed to obtain the system.

Another example, with no concept formulation package, is a five-soldier crew tent project, which resulted in five commercial tents being purchased and evaluated three times at a cost of \$600,000. A proper concept formulation package, including tradeoff and other analyses, would have identified the most promising alternative for decision makers.

2. U.S. Army Audit Agency, NE 91-204, Acquisition of Nondevelopmental Items. 17 June 1991

The audit, among other findings, found that five separate Army commodity command groups managing 39 commercial item projects didn't properly support acquisition strategies.

a. Acquisition Strategy

The analysis to support the selection of commercial items, which is necessary at the beginning of a project, was not performed. As the Army Audit Agency found, "DA (Department of the Army) sometimes directed developers to use nondevelopmental items, and managers therefore believed there was no real need to perform the comprehensive, upfront analysis required to support their strategies." [pg. 19]

b. Market Investigations

Market investigations were not documented for 11 of the 39 projects. Of the remaining 28 projects, a total of 21 had incomplete documentation. As the Army Audit Agency noted, “The investigations didn’t adequately support the streamlining actions managers took—particularly the elimination of a development or prototype phase before production ... As a result, the development effort required to adapt or integrate these items had to occur during production.” [pg. 25]

c. Concept Formulation

Of 29 projects reviewed for a complete concept formulation package, none supported this concept formulation characteristic. The majority, 22 projects, didn’t have any of the concept package completed. For the 7 projects, only the portion of the concept formulation package that dealt with cost and operational effectiveness was complete.

d. Management of Integration

As the Army Audit Agency stated in this report regarding integration efforts, “Such efforts not only require research and development, but may need to undergo both a demonstration and full-scale development phase unless risk is determined to be sufficiently low.” [pg. 28] Eight of the Army potentially high-risk integration projects, totaling \$1.7 billion, didn’t have a research and development (R&D) phase prior to production. Although utilizing commercial item off-the-shelf components, the systems were high-risk integration projects for which the Army had documented only minimal information to show that the projects would meet user requirements after integration was accomplished.

e. Logistics Support

The Army Audit Agency reviewed 39 commercial item projects for which logistics support costs had been projected at \$24 billion. These projects had critical issues related to logistics support, which hadn’t been addressed early enough in the acquisition process. Three of these issues are as follows: reliability, support requirements, and technical data for competitive reprocurement.

(1) Reliability. The Army Audit Agency reviewed 39 commercial item programs, many with major deficiencies. They found that 11 of these projects had no quantitative reliability requirements established. In 13 of the projects, reliability had not been adequately addressed during market investigations. In several cases, contractors' reliability estimates had been received without the performance data, which is necessary in order to evaluate the contractor reliability claims. In 15 of the reviewed projects, the Army Audit Agency found that material developers hadn't adequately conducted reliability testing prior to award of the production contract. It was found that systems were fielded that had subsequent reliability problems, which could affect system readiness and significantly increase costs. As the Army Audit Agency said, "The failure to adequately address reliability early in the acquisition process for new programs significantly increases the risks associated with using nondevelopmental items to satisfy Army requirements." [pg. 40]

(2) Support Requirements. Many of the 39 projects reviewed had no reliability testing, which would have reduced the risk of critical decisions about logistics support. In all cases, the most expeditious means available were used to establish the logistic support plans, which were not necessarily the best or most cost-effective decisions for the Army.

(3) Technical Data for Competitive Reprocurement. For 14 of the 39 projects reviewed, data adequate for reprocurement was not acquired. Consequently, the Army will have to use the sole source vendor for any reprocurement of spare parts or systems throughout their complete lifespan. Some managers assessed the availability of data suitable for competitive reprocurement in their market analysis. But many other market investigations either were not documented, or the availability of technical data was not addressed during the market investigations. Some managers used lifetime contractor support, not having considered technical reprocurement data as necessary. Others decided that data necessary for reprocurement was too expensive. In most cases, managers didn't use economic analysis or any other proper analytical technique prior to their decision. It was determined by the Army Audit Agency that several projects would have benefited from obtaining technical data suitable for

competitive repurchase. Those programs either had to acquire replenishment spares at significantly higher prices (Lightweight Digital Facsimile), or had to find a replacement unit because spares and contractor support could not be obtained (Basic Generation Unit used in the Battlefield Electronics Communication System). [pgs. 44-45]

3. U.S. Army Audit Agency, NE 90-209, Acquisition of Nondevelopmental Items: Fort Monmouth, New Jersey. 11 September 1990

This audit found that the Army advocate for commercial items had not been involved enough to make sure that program managers considered the commercial item approach. Furthermore, it was discovered that the advocates were not adequately monitoring commercial item projects to document “lessons learned,” or to make sure that the two main objectives of commercial items were achieved: the reduction of program cost and acquisition time. Also, market investigations and concept formulation analyses either were not conducted at all or were improperly conducted, and project documentation was either lax or nonexistent. Complex integration projects were awarded without adequate testing to assure that they were operationally suitable and that they met the Army requirements. Support concepts were not adequately investigated or justified to demonstrate the cost-effectiveness of the selected support concept during daily use, especially under wartime conditions.

a. Acquisition Strategy

Key phases and critical steps of the acquisition process were eliminated without explanation for all of the 15 commercial item projects reviewed. Thus, acquisition strategies that were followed were not adequately supported by analysis. As a result, managers often followed inappropriate strategies for the category of commercial item acquired. For example, complex commercial items requiring integration were frequently acquired with a strategy more appropriate for low-risk, off-the-shelf items. Seven complex commercial item projects went into production without a separate R&D phase to obtain and evaluate prototypes. When any phase of the acquisition process is eliminated or combined, Army regulation requires that the material developer justify their decision in the acquisition strategy. Most of the strategies reviewed simply stated that the commercial item approach chosen eliminated the need for research and development.

b. Market Investigations

Market investigations were not documented for five of the 15 commercial item projects reviewed. There was documentation to show that market investigations had been started for 10 of the 15 projects; however, they were incomplete and unacceptable for decision-making purposes. In some cases, PMs cited “urgent requirement” as the reason for inadequate market investigation. However, even follow-on contract options were awarded without justification for not having a market investigation.

c. Concept Formulation

The concept formulation process was not completed for any of the 15 projects reviewed. The acquisition strategies did not address this key step, nor did they explain why the required concept formulation process was not performed. The Army Audit Agency found that PMs felt that since they had been directed to use commercial items by higher management, there was neither a need nor a requirement for the concept formulation phase.

d. Test and Evaluation

Production contracts for 12 of the 15 projects were begun without independent test and evaluation to determine whether the items met Army requirements. These contracts were initiated in spite of the fact that all categories of commercial items are required to undergo operational test and evaluation (OT&E) before production, unless an independent market investigation report concludes that such testing can be reduced or eliminated.

During a review of 15 commercial item projects, the Army Audit Agency also found that 11 items did not have OT performed. As the Army Audit Agency says, “In total, about \$1.8 billion was spent acquiring nondevelopmental items without adequately showing the suitability of the items in a realistic operating environment.” [pg. 31]

e. Logistics Support

An Army Audit Agency review of ten commercial item projects, with estimated LCC support costs of \$24 billion, had no analysis performed that justified the logistics support concept selected.

In the AN/PRC-127 Radio, for example, the determination was made to use a throwaway repair concept to support the radio's receiver-transmitter after the manufacturer's warranty expired. A maintenance cost-effectiveness analysis performed prior to contract award concluded that repair costs were about the same as replacement costs, hence the throwaway decision. However, when the contract was awarded, the actual unit price was much higher than maintaining the receiver-transmitter would have been. Nonetheless, the support concept was not reevaluated.

(1) Reliability. The Army Audit Agency reviewed seven commercial item projects for their reliability. They found that the material developers did not ensure that qualitative reliability requirements were documented during the concept exploration phase, prior to awarding the production contracts. Three of the commercial item programs' requirements were not established at all. In the other four programs, managers used the contractor's predicted values for the quantitative requirements, which were basically technical estimates and not based on analysis of the item's operating mission.

(2) Supportability. An Army Audit Agency review of ten commercial item projects with estimated life cycle support costs of \$24 billion had no analysis performed that justified the logistics support concept selected. Logistics support plans were usually prepared, but there was no analysis to justify those plans or to demonstrate cost-effectiveness of the support concepts. In most cases, the end-item contractor was to provide maintenance and supply support for the life expectancy of most items. However, there was no analysis performed that showed that contractor support was more cost effective than using the Army's organic support system. For example, as the Army Audit Agency indicated, "Program plans did not ensure that spare parts for the AN/PRC-126 Small Unit Radio would be available at fair and reasonable prices." [pg. 5]

4. Bonheim, Mike LTC, PM – Physical Security Equipment (PSE), Commercial Items Acquisition Data Call, 22 February 2001

PM-PSE acts as the PSE focal point for the Army and other Services. The DoD Physical Security Equipment Action Group has created a Commercial Off-The-Shelf working group to identify commercial physical security and force protection equipment that can immediately be used to solve terrorism deficiencies. Under the Chairman Joint Chiefs of Staff Instruction, CJCSI 5261.01A, commanders are provided funds to react as follows: “The fund provides a means for CINCs to react to unanticipated requirements from changes in terrorist threat level or force protection doctrine/ standards.” [CJCS, pg. 1]

Therefore, as the PSE focal point, PM-PSE has been involved in commercial item security equipment projects, identifying several problems as follows:

a. *Needs Determination*

A variety of Government users are involved in the purchase of security equipment. For the most part these users have no experience or training in the acquisition process. This results in difficulty in obtaining a user statement of work that accurately identifies what they need or want the product to do.

b. *Reliability*

There may be a multitude of buyers from different commands for the security equipment, each having their own certification requirements. Consequently, a vendor will not be able to certify the product for all scenarios.

Also, the vendors’ performance claims have proven inaccurate. As PM-PSE states, “In cases involving two portable barriers both barriers failed the initial crash test and had to be reconfigured by the manufacturer before a successful test could be accomplished.” [Bonhiem, pg. 2]

c. *Market Investigations*

There has been no centralized database established for equipment that has been purchased as well as the results of their operational use or testing.

d. Logistics Support

There are no durability or lifespan indicators for these physical security commercial items. Repair procedures are nonexistent. PM-PSE states, “In many cases, detailed repair documentation is not available. If the item fails it must be scrapped or returned to the factory for repair - a much more difficult task in deployed units than the civilian world.” [Bonhiem, pg 2] Determining the quantity and type of spare parts is an issue. As PM-PSE indicates, “Determining the amount of repair and spare parts and where there are stored and subsequently issued needs to be determined.” [Bonhiem, pg. 2]

e. Test and Evaluation

There may be a multitude of buyers from different commands for the security equipment, each with their own testing requirements. Consequently, a vendor will not be able to test or certify the product for all scenarios.

5. GAO/NSIAD-95-161, UNMANNED AERIAL VEHICLES: Maneuver System Schedule Includes Unnecessary Risk, 15 September 1995

The GAO states that because of premature entry into production, two previous UAV programs suffered from costly redesigns in order to achieve acceptable system performance. The two previous nondevelopmental UAV systems, the Pioneer and the Hunter, were both started into production without being subjected to any operational testing.

Premature production of the Pioneer resulted in doubling the costs for nine systems that did not meet the operational requirements of the user. As of the writing of this GAO report, the Hunter system was also experiencing problems and an uncertain future after an expenditure of \$627 million.

Because of the previous dubious acquisition track record, the GAO issued this interim report to bring attention to inadequate testing aspects of the program that, it was believed, would unnecessarily increase DoD’s program risk.

Test and Evaluation

This report states that the Joint Tactical Unmanned Aerial Vehicles project office planned to begin production of the Maneuver System before making sure that the system could meet operational requirements via operational testing prior to, or during, low rate initial production (LRIP). Test articles are normally obtained from LRIP; however, in this case there was no testing of the LRIP vehicles planned by the project office.

6. GAO/NSIAD-96-2, Unmanned Aerial Vehicles: Hunter System Is Not Appropriate for Navy Fleet Use, 1 December 1995

The GAO reviewed a variant of the \$4.2 billion joint UAV program planned for use on Navy amphibious assault ships to provide reconnaissance, target acquisition, and other military missions.

Needs Determination

The GAO finding was that, “The Joint Tactical UAV Projects Office is proceeding with the acquisition of the Hunter shipboard variant even though all Navy fleet commanders have stated that they do not want the system on Navy ships.” [Pg 1] The fleet commanders opposed the Hunter UAV because of the adverse impact it would have had on all other flight operations from their ships, and because its performance capability was inadequate for their needs.

Despite fleet concerns, the Chief of Naval Operations planned to proceed with procurement of the shipboard variant.

7. The DoD IG Report 96-111, Allegations Involving the Procurement of the Hunter Unmanned Aerial Vehicle-Short-Range System, 7 May 1996

From 1990 to 1996 the GAO issued six negative reports concerning the Hunter UAV Short Range program system deficiencies, some of which are documented above. The first report in September 1990 indicated that the Navy’s testing strategy for the UAV would not be in a realistic operational environment, and that full-rate production would begin prior to the system meeting the Navy’s requirements. The September 1992 report indicates that adequate user tests were not performed in a realistic operational environment to assure that critical system performance capabilities satisfactorily existed.

The December 1993 report indicates that the system didn't meet milestone criteria for entry into LRIP, and that testing had not been done to ensure that operational requirements were met. The June 1995 report states that the system was logistically unsupportable, and that tests identified serious performance problems. The September 1995 report states that the acquisition demonstrates the adverse consequences of initiating production without first obtaining adequate assurance of satisfactory system performance. This last report of May 1996 states that: "The audit partially or fully substantiated the allegations that the LRIP system did not conform to contract requirements, operator safety was at risk, reliability was inadequate and the system was never subjected to operational testing." [pg. 1]

In January 1996, the Under Secretary of Defense (AT&L) terminated any future Hunter system acquisitions.

a. Needs Determination

The Hunter system requirements were not met. As the DoD IG report states, "The Government bought the first of the seven LRIP systems knowing major performance deficiencies existed that made the system clearly fall short of contractually defined requirements. The system has numerous hardware shortages that history shows that the contractor will never satisfy." [pg. 4] It can be seen that the PMO staunchly supported the program as demonstrated by the fact that the Government contracting officer issued 34 waivers to prevent program delays due to specification nonconformance. The Hunter Project Office also approved 257 engineering design changes and 125 specification changes to resolve inconsistencies.

b. Reliability

The DoD IG found that the Hunter Unmanned Vehicle LRIP did not have adequate reliability. As the DoD IG report stated, "The Hunter system did not meet five of nine contractual requirements for reliability, availability, maintainability, and built-in-test." [pg. 7] Soldiers and military instructors using the system also said that it was unreliable. The Project Office continued to support the program, indicating that "test results may not reflect the system's long-term averages for the time to repair." [pg. 8]

c. Test and Evaluation

The DoD IG found that the Hunter Unmanned Vehicle LRIP was not subjected to realistic operational testing. The Project Office subjected the prototypes to limited user tests, but never performed any operational testing on the LRIP systems. The DoD IG stated,

The technical tests were done in a controlled, sterile environment and any advertised results were not representative of the system's true capabilities and real limitations. The system was never subjected to test scenarios that replicated the true conditions the hardware would encounter. Credible operational tests have never been accomplished. [pg. 9]

8. DoD IG Report 95-193, DoD Hotline Allegations Regarding the Naval Special Warfare Patrol Coastal Ship and the Rigid Inflatable Boat Acquisition Programs, 15 May 1995

At the start of the coastal ship portion of this program, the Chief of Naval Operations (CNO) was considering three alternative approaches: a commercial item approach using existing patrol craft technology, modification of an existing 110-foot patrol craft, and new development. The CNO rejected new development due to cost and time constraints. The modification approach was also rejected, since the 110-foot craft did not meet all the operational performance requirements. Finally, the CNO approved a Non-Acquisition Program Definition Document, which “defines and gives direction to Advanced and Engineering Development programs that explore technologies or integrate systems not directly related to a procurement.” [pg. 7] The Non-Acquisition Program Definition Document determined that, “The boat’s performance and configuration requirements were to be determined based on existing craft in the commercial marketplace.” [pg. 7]

Thus, it was determined without further review that a commercial item program would be selected. A firm-fixed price contract was awarded for 13 patrol craft using the commercial item approach. Over a year later, the Supervisor of Shipbuilding imposed General Ships Specifications (GSS) requirements on the patrol craft contractor. This caused the program to evolve from commercial item to a developmental acquisition

program. The GSS requirements change contributed to greater than 40 percent cost growth within the program.

Similarly, the Rigid Inflatable Boat (RIB) program evaluated four boats as commercial item candidates. None of the boats met operational requirements. After the evaluation, the PM for Support Ships, Boats, and Crafts directed the Naval Surface Warfare Center (NSWC), “to develop a technical data package for a 33 foot (10-meter) RIB.” [pg. 8] This directive effectively changed the program from a commercial item program to a developmental acquisition program.

The DoD IG found that the Navy deviated from the commercial item acquisition approach in both cases, without conducting the necessary risk analyses to support the decision. The Navy had modified the ship requirements beyond the point at which a commercial item could satisfy them, and then awarded a firm-fixed price contract for the boat without adequate risk analyses to support the decision.

a. Needs Determination

In the coastal ship program, the Navy combined requirements, which led to the need for a larger platform. There was no detailed requirements review with the program sponsor or operators. The increased requirements necessitated changes beyond which a commercial item acquisition approach could prove satisfactory.

In the RIB program, the requirements within the Operational Requirements Document (ORD) were more restrictive than those within the Non-Acquisition Program Definition Document. This should have caused the Naval Special Warfare Rigid Inflatable Boat program office to determine areas in which requirements could have been compromised without loss of mission effectiveness.

b. Design

Specifications for the RIB were based on commercial item subsystems and components. However, their integration into a functioning boat exceeded the design and performance capabilities of existing vessels.

The RIB design process was accelerated by the RIB PM from 28 weeks to 13 weeks, but no time was allowed to assess or minimize the risk that this created in the

acquisition process. It was later determined by the Naval Sea Systems Command (NSSC) that the design should not have been accelerated.

c. Risk Analysis

The NSCC did not perform an adequate risk analysis that would have revealed the high technical risk caused by the failure of commercial vessels to meet both the ORD and the greatly compressed acquisition schedule.

d. Test and Evaluation

There was no first article contract for the LRIP of a limited number of boats prior to full-rate production for testing purposes. Limiting the initial production contract to the first two boats for test purposes would have minimized the production risk for the remaining boats. Because there was no first article test contract for the LRIP of a limited number of boats prior to full rate production, there was no operational testing, either. Eliminating testing increased the production risk that boats would not meet user operational requirements, and would then have to be modified later at greater expense and time.

D. COMMERCIAL ITEMS PROBLEMS, ISSUES AND CONSEQUENCES SUMMARY

The table below summarizes the problems/issues from this chapter as a “risk”, and the “potential consequence” of the unresolved risk.

Table 1 Commercial Item Consequence Matrix

| RISK | POTENTIAL CONSEQUENCE |
|--|--|
| <p><u>Needs Determination</u></p> <ul style="list-style-type: none"> - User requirements improperly identified or misunderstood - Requirements allowed to grow; i.e., requirements are gold plated. | <ul style="list-style-type: none"> - Need unsatisfied; wrong product produced and purchased; resources wasted; possible program elimination. - “Best value” solution will not be produced; impacts to cost, schedule, technical performance; DoD resources wasted. |

Table 1 (continued) Commercial Item Consequence Matrix

| RISK | POTENTIAL CONSEQUENCE |
|--|--|
| <p><u>Acquisition Strategy</u></p> <p>- Incorrect streamlining acquisition strategy used.</p> | <p>- Items procured without key acquisition phases complete; impacts to program cost, schedule and technical performance; DoD resources wasted.</p> |
| <p><u>Market Investigations</u></p> <p>- Inadequate or no market investigation performed.</p> | <p>- Wrong item procured, “best value” item not procured, impact to cost, schedule and technical performance, DoD resources wasted.</p> |
| <p><u>Concept Formulation</u></p> <p>- Inadequate or no concept formulation package prepared.</p> | <p>- Best technical solution not selected; impact to cost, and schedule, DoD resources wasted.</p> |
| <p><u>Risk Analysis</u></p> <p>- A risk analysis was not performed</p> | <p>- Impact to cost, schedule and technical performance; DoD resources wasted; the program may be eliminated.</p> |
| <p><u>Manage Integration</u></p> <p>- Inaccurate assessment of program integration risk.</p> | <p>- R&D, or T&E not performed; impact to cost, schedule and technical performance; DoD resources wasted; the program may be eliminated.</p> |
| <p><u>Test & Evaluation</u></p> <p>- Testing was inadequate or was not performed.</p> | <p>- Best technical solution not developed; performance, reliability & maintainability goals not met; impacts to total LCC; operational effectiveness & suitability not proven; impacts to program cost, schedule, and technical performance; potential mission failure; DoD resources wasted.</p> |

Table 1 (continued) Commercial Item Consequence Matrix

| RISK | POTENTIAL CONSEQUENCE |
|--|---|
| <p><u>Reliability</u></p> <ul style="list-style-type: none"> - The program reliability was inadequate. - No quantitative reliability requirements established. - Contractor's reliability estimates not verified. - Inadequate reliability testing prior to contract award. | <ul style="list-style-type: none"> - RAM is adversely impacted; program's total LCC is adversely impacted; potential mission failure; DoD resources are wasted. |
| <p><u>Support Requirements</u></p> <ul style="list-style-type: none"> - Incorrect program support concept is selected. - Inadequate logistics support is planned. | <ul style="list-style-type: none"> - Inability to support the system during a wartime environment; mission failure; program's total LCC is adversely impacted; DoD resources are wasted. - Sub optimal logistics support, increased system LCC, DoD resources wasted. |
| <p><u>Tech Data - Competitive Reprocurement</u></p> <ul style="list-style-type: none"> - Data adequate for reprocurement is not obtained. | <ul style="list-style-type: none"> - A sole source vendor must be used; reprocurement costs are increased; an inability to obtain parts; potential mission failure; DoD resources are wasted. |
| <p><u>Design</u></p> <ul style="list-style-type: none"> - The design was underestimated. - The design process was incorrectly accelerated. | <ul style="list-style-type: none"> - The best design will not be completed; impacts to program cost, schedule and technical performance. - Impact to program cost, schedule and technical performance. |

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IV. ANALYSIS – COMMERCIAL ITEM USAGE EXPERIENCE & PROBLEMS

A. INTRODUCTION

In this analysis chapter, all of the possible causes, as well as the underlying known causes, of the problems and issues in the previous chapter will be presented and analyzed. It is important to determine the potential critical causes of the problems and issues in order to arrive at a corrective action, or “best practice,” and thus to provide a template which PMs can use to preclude similar occurrences in the future.

The analysis will be presented as an array, in the same manner as it was in the previous chapter. A statement of each issue from the previous chapter will be followed by examples to demonstrate some of the known causes of that particular issue. At the end of this chapter is a table summarizing all the known and potential causes, which have been identified from the reports that were the basis of this research, as cited in Chapter III.

B. ROOT CAUSE PROBLEMS AND ISSUES

For the issues cited below in paragraph C, there are several recurring causes that underlie nearly every issue. These causes can be called “root causes,” because they appear to be at the terminus, root, or bottom of the explanation for many of the issues. Several root causes have been identified, as follows:

1. Inadequate Education or Training within the Acquisition Community

This can always be used as an excuse for errors in judgment. Because their leadership has told acquisition personnel that they must use commercial items, they consider this edict as justification for the elimination of critical steps in the acquisition process when acquiring commercial items. Without the knowledge (that education or training would give them) of the intricacies or difficulties of each critical part of the acquisition process, acquisition personnel may not understand that the process cannot be abbreviated or eliminated without adequate investigation and justification. Consequently, they suffer the risk of making a disastrously poor decision.

Because commercial item usage is fairly new, there are many gray areas with respect to its correct usage in the acquisition process. Incorrect usage happens frequently enough to make training and education an important issue.

2. Inadequate Use of Lessons Learned

In several cases previously cited, errors noted in audit reports were repeated. This indicates a serious failure to learn from previous mistakes. The commercial item advocate for the Army was supposed to accumulate lessons learned, but failed to do so. Within the various Army Audit Agency reports, similar errors occurred time after time, indicating that lessons learned are not being applied to new Army acquisition situations.

LTC Michael Bonheim indicated in his paper that in the area of market investigations, there is no centralized database for the accumulation of lessons learned.

3. Incorrect Culture-Driven Decision Making

At the root of many poor decisions within the acquisition corps seems to be the “culture” that drives the decision. That is, the decision is a foregone conclusion, given the structure and forces that impinge upon the PM during his decision-making process, as previously noted in Chapter III. This area needs to be researched in greater depth.

C. ANALYSIS OF PROCESS PROBLEMS AND ISSUES

Noted below are examples that highlight the major causes of the issues identified in commercial item usage.

1. Needs Determination

Issue: Needs or user requirements have been improperly identified, misunderstood, or ignored.

The Navy coastal ship program started with a requirement to use a non-acquisition approach to “base the acquisition on existing craft in the commercial marketplace.” [DoD IG, pg. 7, 15 May 95] Because General Ships Specifications (military specifications) were imposed on the contractor one year later, the subsequent acquisition decision changed from the original goal of procuring a commercial vessel to that of procuring a vessel specifically designed to comply with military specifications. This decision was made without either risk analysis or cost analysis to support the

decision. Certainly, the typical acquisition process was not followed in this case. The causes of this procedural omission could have been any of the following: inadequate acquisition education or training, cultural issues that stressed speed, or cutting corners and costs at the expense of the accurate performance of the acquisition process. Another potential cause of this procedural omission could have been the powerful influence that culture has upon the way we perform and operate. The PM's culture is one that is cost, schedule, and funding driven, each of these being success oriented - sometimes constraining or preventing performance of the very activities that would keep the PM out of difficulty.

In the Navy UAV case, the Project Office blatantly ignored the fleet commanders' dissatisfaction with the Hunter UAV. The causes here could have been many, such as not having a clearly written ORD that would have identified the need to minimize interference with existing onboard flight operations, inadequate use of IPT's in the acquisition process that should have included the warfighter as a team member, inadequate training or education of the Projects Office personnel, or a culture-driven decision by the PM to ignore the warfighter in the interest of swift project completion.

In the PM-PSE case, a variety of users had differing requirements, but no experience or training in defining these requirements. The varied causes identified here are as follows: inadequate teaming between user and PM, inadequate training and/or education of the user in the acquisition process, lack of standardization of the security equipment, lack of a centralized force protection database, and failure of the users to be flexible enough to consider modifying their requirements in order to more easily utilize commercial force protection items.

Issue: Requirements were allowed to change or grow, i.e., requirements were "gold plated."

In the coastal ship program, the Navy's requirements creep was due in large part to combining requirements, which led in turn to the need for a larger platform, causing the length of the vessel to grow from 110' to 170' in length. This was probably caused by not having a detailed requirements review with the program sponsor or operators, as was

mentioned in the audit. In other words, there was no IPT, and therefore, no coordination among the stakeholders, as would have occurred had there been an IPT. An IPT would have incorporated the teaming tenets of cooperation, coordination, consensus, and decision streamlining. Additional causal contributors were lack of a clearly written ORD, lack of adequate acquisition planning, and inadequate market research in the beginning phase of the program.

2. Market Investigation

Issue: *There were inadequate or no market investigations performed.*

At the Natick RD&E Center, there was a policy to leave market investigations either incomplete or undocumented, in order to “streamline” or speed up the process. This was done without apparent concern for, or knowledge of, the negative impact that inadequate market investigations would have on the efficiency and effectiveness of the material selection process. This exemplifies either culturally influenced decision-making in order to incorrectly “streamline” the process to save time and money, or inadequate training and/or education in preparation for the acquisition process, which would have enabled those involved to make the correct decisions from the result of their market investigations. Another alternative is that organizations might have known the right thing to do, but were so resource constrained that they couldn’t get the documentation done.

The lack of a database for market investigations was documented by PM-PSE, LTC Bonheim, and was also an issue in Dr. Gansler’s USD(AT&L) memorandum of January 5 2001, which is quoted as follows:

To help overcome these barriers to accessing commercial items, I am taking the following actions: ... Requesting that the IPT determine the feasibility of establishing a pilot program so that the Services and Agencies may collect market research and Commercial Item Determinations in a central database, or developing tools to assist in ensuring commercial item determinations are reasonably consistent. I request that the recommendation regarding this action be presented to DUSD (AR) within 90 days of the date of this memorandum. [DoD. USD(AT&L), 5 January 2001]

This suggests an awareness within the acquisition community that there are “issues” related to ease of access to both commercial item information as well

as usage data within the acquisition community, which, if readily available, might make the process more efficient. This commercial item market database could also capture the valuable lessons learned, which seem to be lost to successive generations of acquisition members.

3. Concept Formulation

Issue: *There were inadequate or no concept formulation packages prepared.*

Examples demonstrating this issue are to be seen in the 19 March 1990 Army Audit Agency report. This report is about Natick RD&E Center's lack of preparation of the concept formulation packages for two projects, which resulted in increasing costs and schedules for both projects. One example is the saltwater purification project, for which a tradeoff analysis would have identified the Naval system as a potential alternative, thus providing great time and cost savings for the Army project. The second example is the case of the five-soldier crew tent project, where a concept formulation package with its tradeoff analysis would have eliminated the need to test five tents, three times each.

4. Risk Analysis

Issue: *A risk analysis was not performed.*

The decision to eliminate risk analysis in the Navy's coastal ship program can be attributed to lack of training, lack of education, or lack of attention to lessons learned in the acquisition process; alternatively, it might have been culture-driven in the mistaken premise that time would be saved if this step in the process were eliminated. Although there is a Systems Acquisition Management curriculum (816) taught at the Naval Postgraduate School, Naval officers are not enrolled. This is due to the fact that a military specialty code for Systems Acquisition Management does not exist for Naval officers. Consequently, the lack of specific training or education in the acquisition field is understandable as a potential cause for the elimination of risk analysis in their acquisition process.

5. Acquisition Strategy

Issue: *The acquisition process was incorrectly streamlined, resulting in the use of an incorrect acquisition strategy.*

In all of the U.S. Army Audit Agency reports, incorrect acquisition strategy was a significant finding.

In the Natick Center report of 19 March 1990, the strategies were inconsistent with the categories of commercial items being used. This is an indication of either inadequate training or lack of education in the acquisition process, crucial for the identification of each acquisition category (i.e., commercial item, modified commercial item, nondevelopmental item, or developmental item); or the premeditated incorrect streamlining of the process to save money and time for culture-driven reasons.

In the 11 September 1990 U.S. Army Audit Agency report, key phases and critical steps of the acquisition process were eliminated without explanation or justification. This is an indication of either a lack of training and/or education regarding the importance and necessity of each part of the acquisition process, or culture-driven poor decisions in order to save the program time and/or money.

In the 17 June 1991 report of the U.S. Army Audit Agency, the incorrect acquisition strategy was used because, as the five agencies audited in this report told the Army Audit Agency, they were directed to use commercial items, and therefore believed this relieved them of performing the necessary analysis to determine and support strategy decisions. This is an indication of lack of training and/or education concerning the importance and necessity for each part of the acquisition process. It is also an example of how important “culture” is in decision making. The fact that agencies are told to do something does not relieve them of the responsibility to “think,” and thus make well-chosen decisions instead of poor ones.

6. Design

Issue: *The design was underestimated.*

The design issue, exemplified by the Coastal Ship project, can be attributed to inadequate training or education on the part of the Navy design estimation process when utilizing commercial items; or it could have been caused by a culture-driven need to reduce the time and/or cost of the acquisition.

Issue: *The design process was incorrectly accelerated.*

As an example of this issue, the PM accelerated the Rigid Inflatable Boat (RIB) design process from 28 weeks to 13 weeks without any analysis given to the risk or consequences of doing so. The clear goal of the PM was to reduce the time required of the project's design task. This issue could be attributed to inadequate training or education on the part of the Navy concerning the use of risk analysis in the acquisition process; or it could have been caused by the culture-driven need of the PM to reduce the schedule and/or cost of the program.

7. Management of Integration

Issue: *Integration projects associated with high risk for a program were not managed properly.*

An example of this issue was published in the U.S. Army Audit Agency's 17 June 1991 report, where it was noted that there were four complex commercial item integration projects for a total cost of \$1.7 billion, none of which had a testing phase prior to awarding their production contract. The commercial items were all off-the-shelf components. However, the integrated systems were not off-the-shelf and were highly complex as well. For these four projects, there was little or no information to prove that the integrated systems would successfully work together to meet the Army's requirements. The failure to manage the integration of commercial items within a program can be attributed to either lack of training and/or education, or a culture-driven desire to reduce the time and/or cost of the program.

8. Test and Evaluation

Issue: *There was inadequate testing or no testing performed.*

An example of this issue is the U.S. Army Audit Agency 11 September 1990 report on the \$643 million Regency Net project, which involved a mix of commercial as well as previously developed military items, all of which had to be integrated via complex software development. This project included both a basic contract as well as four production options. It was awarded at a cost of \$300 million before any prototypes were tested. Another project from the Army Audit Agency 11 September 1990 report on Mobile Subscriber Equipment again involved integration of commercial items with

previously developed military items, as well as the development of complex software. It was not tested until \$1.3 billion of the basic production contract had been obligated, along with two production options. The rationale given to the Army Audit Agency was as follows: “Acquisition strategies for the projects stated that extensive testing was not needed because a nondevelopmental item approach was used or that a contractor demonstrated the item before the production contracts were awarded.” [U.S. Army Audit Agency, pg 21, 11 September 1990] However, the contractor demonstrations did not provide sufficient evidence that the items had met the Army operational requirements. The failure to properly test and evaluate commercial items within a program can be attributed to lack of training or education, or can be caused by a culture-driven need on the part of the PM to reduce the time and/or cost of the program by eliminating or reducing testing.

9. Logistics Support

a. Reliability

Issue: The program reliability was inadequate.

An example of this issue is the PM-PSE paper, which indicated that vendor claims proved inaccurate. This can be traced to either inadequate early testing of the products or inadequate training and/or education concerning the need for adequate evaluation and testing of a commercial item in order to confirm the vendor’s reliability claims.

Another example of inadequate program reliability is the DoD IG report of 7 May 1996, which showed that the Hunter UAV program continued to receive PM support even though it did not have adequate reliability. This can be attributed to the PM’s culture-driven syndrome to protect his program at all costs, in this case by avoiding early testing that might have demonstrated reliability flaws, resulting in a program funding cut and, ultimately, delays or even termination of the program.

The primary cause of inadequate reliability can be traced to inadequate testing early in the program. A major reason for inadequate testing is often the cultural aversion on the part of the PM to both testing and testers, as previously mentioned in

Chapter III, section B-7. Another potential cause, as noted above, is inadequate training and/or education regarding the importance of attaining adequate system reliability.

Issue: No quantitative reliability requirements established.

This issue is exemplified by the U.S. Army Audit Agency reports of 11 September 1990 and 17 June 1991, which both state that many projects had no quantitative reliability requirements established. In the absence of reliability requirements, there is no basis upon which to perform confirmatory tests. However, in some cases, with or without a reliability requirement, contractor reliability estimates were verified, but not early enough to allow time for corrective action. In other cases, reliability testing was not conducted at all.

The cause for not establishing reliability requirements could be one or more of the following: PMs having been culture-driven to save the program time and/or money; lack of training/education which enabled the mistaken belief that management's edict to use commercial items voids the need for establishing reliability of commercial items; or the lack of training and/or education of users and PMs regarding the importance of establishing reliability requirements, especially for commercial items.

Issue: Contractor's reliability estimates not verified.

This issue is displayed in the U.S. Army Audit Agency reports of 11 September 1990 and 17 June 1991. In both reports, vendors' reliability estimates were not verified in the operating environment. In several cases, reliability estimates had been received, but without the performance data necessary in order to evaluate the contractor claims. In four programs, the contractor's predicted values for the quantitative requirements were used, but not verified. These contractor-predicted values were basically technical estimates; they were not based on any real data or analyses and certainly did not reflect the operating environment and conditions where military systems must perform.

The reasons for not verifying a contractor's reliability estimates are attributable to one or all of the following: lack of training and/or education concerning the importance of commercial item reliability verification through testing; culture-driven

decision-making to save the program time and money by eliminating or reducing testing; or lack of training/education enabling the mistaken belief that management's edict to use commercial items voids the need for verifying the reliability of commercial items.

Issue: Inadequate reliability testing prior to contract award.

This issue is exemplified by the U.S. Army Audit Agency 17 June 1991 report, as well as both the DoD IG reports of 15 May 1995 and 7 May 1996. They all stated that many projects had no or inadequate reliability testing prior to contract award. In the case of the Hunter UAV, inadequate reliability, among other issues, killed the program.

Inadequate reliability testing can be attributed to a lack of training and/or education on the importance of commercial item reliability testing early in the program; a culture-driven decision to save the program time/money; or the lack of training and/or education, enabling the mistaken belief that management's edict to use commercial items voids the need for verifying the reliability of commercial items through testing.

b. Support Requirements

Issue: Incorrect/Inadequate program support concept is selected.

The U.S. Army Audit Agency report of 11 September 1990 indicated that for the sake of expediency, the end-item contractor was to have provided both maintenance and supply support for the expected life-cycle for seven of the ten projects reviewed. The reason for lack of adequate logistics support in this case was most likely culture-driven to save the program time and/or money. Lack of training and/or education, related to the importance of establishing and justifying support concepts, also could have played a role.

c. Technical Data for Competitive Reprocurement

The U.S. Army Audit Agency report of 17 June 1991 indicated that 14 projects reviewed did not acquire technical data suitable for reprocurement of spare parts or systems. The causes for not obtaining technical data suitable for competitive reprocurement of parts are attributed to: lack of training and/or education regarding the

importance and difficulty of obtaining commercial item technical data; or culture-driven decisions to save the program money during the acquisition phase.

D. COMMERCIAL ITEM - CAUSE - SUMMARY

In the table below, the problems/issues are listed as risks, along with the potential consequence of the unresolved risk, and their possible causes, as identified in this chapter.

Table 2 Commercial Item Cause Matrix

| RISK | POTENTIAL CONSEQUENCE | POSSIBLE CAUSE |
|--|--|--|
| <u>Needs Determination</u> <ul style="list-style-type: none"> - User requirements are improperly identified, misunderstood or ignored. - Requirements allowed to grow, i.e., requirements are gold plated. | <ul style="list-style-type: none"> - Need unsatisfied; wrong product produced and purchased; DoD resources wasted; possible program elimination. - “Best value” solution will not be produced; impacts to cost, schedule, technical performance; DoD resources wasted. | <ul style="list-style-type: none"> - No acquisition planning/risk analysis performed; inadequate training/education; unclear ORD; IPTs not used; culture-driven decisions; no product standardization; no centralized database; inflexible reqmts. -No acquisition planning/IPT; needs allowed to grow too easily; inadequate ORD; insufficient market research. |
| <u>Acquisition Strategy</u> <ul style="list-style-type: none"> - Incorrect streamlining acquisition strategy used. | <ul style="list-style-type: none"> - Items procured without key acquisition phases complete; impacts to program cost, schedule and technical performance; DoD resources wasted. | <ul style="list-style-type: none"> - Lessons learned not utilized; no evaluation of streamlining decisions; inadequate training/education; incorrect culture-driven decisions. |
| <u>Market Investigations</u> <ul style="list-style-type: none"> - Inadequate or no market investigation performed. | <ul style="list-style-type: none"> - Wrong item procured, “best value” item not procured; impact to cost, schedule and technical performance; DoD resources wasted. | <ul style="list-style-type: none"> - No early, robust, market investigation performed; inadequate training/education; no centralized database/lessons learned; inadequate funding. |

Table 2 (continued) Commercial Item Cause Matrix

| RISK | POTENTIAL CONSEQUENCE | POSSIBLE CAUSE |
|---|---|--|
| <u>Concept Formulation</u> - Inadequate or no concept formulation package prepared. | - Best technical solution not selected; impact to cost, schedule and technical performance; DoD resources wasted. | - Inadequate training/ education/ or lessons learned; incorrect culture-driven decisions. |
| <u>Risk Analysis</u> - A risk analysis was not performed. | - Impact to cost, schedule and technical performance; DoD resources wasted; the program may be eliminated. | - No early, robust, market investigation performed; inadequate training / education / or use of lessons learned; widespread misunderstanding of the complexity of integration. |
| <u>Manage Integration</u> - Inaccurate assessment of program integration risk. | - R&D, or T&E not performed; impact to cost, schedule and technical performance; DoD resources wasted; the program may be eliminated. | - No early, robust, market investigation performed, inadequate training / education / or use of lessons learned; widespread misunderstanding of the complexity of integration. |
| <u>Test & Evaluation</u> - Testing was inadequate or was not performed. | - Best technical solution not developed; performance, reliability & maintainability goals not met; impact total LCC; operational suitability & effectiveness not proven; impacts to program cost, schedule, and technical performance; potential mission failure / program elimination; DoD resources wasted. | - Culture-driven poor decisions; inadequate training / education / or use of lessons learned; lack of funding. |
| <u>Design</u> - The design was underestimated. - The design process was incorrectly accelerated. | - The best design will not be completed; impacts to program cost, schedule and technical performance. - Impact to program cost, schedule and technical performance. | - Inadequate training / education / or use of lessons learned; culture-driven poor decision. - Culture-driven; inadequate training/education/use of lessons learned. |

Table 2 (continued)

Commercial Item Cause Matrix

| RISK | POTENTIAL CONSEQUENCE | POSSIBLE CAUSE |
|--|---|---|
| <p><u>Reliability</u></p> <ul style="list-style-type: none"> - The program reliability was inadequate. - No quantitative reliability requirements established. - Contractor's reliability estimates not verified. - Inadequate reliability testing prior to contract award. | <ul style="list-style-type: none"> - RAM is adversely impacted; program's total LCC is adversely impacted; potential mission failure; DoD resources are wasted. | <ul style="list-style-type: none"> - Poor culture-driven decision; inadequate training / education / use of lessons learned; lack of funding. |
| <p><u>Support Requirements</u></p> <ul style="list-style-type: none"> - Incorrect program support concept is selected. - Inadequate logistics support is planned. | <ul style="list-style-type: none"> - Inability to support the system during a wartime environment; mission failure; program's total LCC is adversely impacted; DoD resources are wasted. - Sub optimal logistics support, increased system LCC, DoD resources wasted. | <ul style="list-style-type: none"> - Poor culture-driven decisions; inadequate training / education / use of lessons learned; misunderstanding of the schedule needed for logistics even for CIs/NDIs. - Insufficient time allotted for logistics support planning / preparation; EMD phase eliminated. |
| <p><u>Tech Data - Competitive Reprocurement</u></p> <ul style="list-style-type: none"> - Data adequate for reprocurement is not obtained. | <ul style="list-style-type: none"> - A sole source vendor must be used; reprocurement costs increased; an inability to obtain parts; potential mission failure; DoD resources are wasted. | <ul style="list-style-type: none"> - Poor culture-driven decisions; inadequate training / education / use of lessons learned. |

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V. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

The objective of this thesis has been to study the problems and issues experienced by PMs and industries utilizing commercial items in their programs. To explore this subject, the researcher has reviewed and analyzed the history of problems and issues experienced by acquisition programs using commercial items in their programs. This chapter presents the conclusions of this thesis, offering recommended best practices for utilizing commercial items on a program, as well as suggesting areas for further research.

B. METHODS AND PROCESSES “BEST PRACTICE” CONCLUSIONS

It appears that many mistakes or decisions have been made due to the fact that the decision-makers thought they understood the process leading them to make the correct streamlining decision. That is, they thought that their expertise would enable them to bypass certain requirements, or to ‘streamline’ the process for the purpose of saving time and money, but instead costed their program both time and money due to the resultant errors.

1. Lessons Learned

It is imperative to learn from our mistakes. There are many lessons to be learned from the various governmental audits and reports, and from the use of commercial items in each of the services. These lessons learned should be accumulated in a centralized database available to the military service PM community as a web site, and should also be taught in various acquisition courses. This database website should incorporate market investigation, research material, lessons learned, and the “best practices” to use in particular situations and circumstances. It should be not only an information database website, but also a website for learning about the unique aspects of using commercial items in the acquisition process

2. Culture-Driven Mistakes

As noted previously in Chapter III, section seven, PMs have occasionally been driven by culture to make negative and flawed decisions that have adversely impacted

their programs, and occasionally their careers. In order to change these negative results, it is necessary to change the basic culture and reward system that impinges upon the PMs' world.

The PM-test community relationship is a vivid example of the adverse impacts of the wrong culture and reward system at work. Rather than Congress killing a program because it has failed testing, the discovery of technical problems during early testing instead of during production should be rewarded, before the cost to fix such technical problems becomes increasingly expensive and time consuming.

To foster a true and lasting attitudinal change of the PMs' aversion to T&E within the acquisition realm, it will be necessary to change the current culture and reward system. The acquisition of knowledge through testing, and the subsequent increase of a product's technological maturity, must be viewed by everyone in the acquisition community as a good and desirable result, and rewarded accordingly. For example, DT programs that first mature their technologies through adequate testing, thus allowing their programs to enter the production phase with subsequent low-risk technologies, should be rewarded by full funding and continuation of their programs. On the other hand, programs that attempt to enter production with high to medium-risk technologies should be penalized.

In many cases the PM/PMO is well aware of and sensitive to the issues faced but the institutional biases are overwhelming and cause them to make poor decisions.

3. Training and Education

Training and education is extremely important within the acquisition community. The military makes the higher education and leadership training of their personnel a career-long endeavor. However, within the DoD civilian community that is not necessarily the case, and this must change. The acquisition of major weapon systems is the most complex environment within DoD, and all of its personnel must be adequately trained and educated continuously in order to master its intricacies, maintain current knowledge and execute the acquisition process properly.

There appear to be large gaps within the education process, especially concerning the use of commercial items and nondevelopmental items within DoD acquisition programs. Policy drives the acquisition process and is far ahead of the education of its disciples, especially for commercial item usage. There is inadequate training for user personnel to learn how to write performance-based requirements. There is no risk management training oriented toward commercial item/nondevelopmental item usage. There has been inadequate market investigation training. The acquisition training and education process should be critically examined for such voids and the deficiencies corrected.

Training and education alone will not correct the DoD commercial item usage problems. It is imperative that the “culture” within DoD that drives PMs to make negative, self-defeating decisions be addressed and changed. The culture and reward system must promote and reward good decisions. A research article by a professor at the Naval Postgraduate School about the effect of training on changing the culture within DoD inventory management noted, “To be effective, it must be coupled with changes in other organizational design factors such as reward systems and management control systems. Training is only one of many inputs to organizational behavior. Trying to alter a culture by changing only one of these factors is usually a wasted effort.” [Kang, pg. 21]

4. Needs Determination

Users initiate an acquisition as they conduct the requirements generation process. User-led multifunctional teams need to be formed as early as possible to assist the user in fully grasping the nature, potential limitations, and advantages of available commercial items. Only through an adequate understanding of the advantages of commercial items can the users and acquisition community embrace the flexibility necessary in defining system requirements that will encourage greater consideration of commercial item usage.

5. Acquisition Strategy

It is critical that both the buying organizations and the acquisition community understand the importance of devising farsighted acquisition strategies, ones that adequately address the program uncertainties that can result from the use of commercial items. Acquisition strategies should be devised to target those commercial item

uncertainties with the potential to impact product performance, quality, and logistical support.

6. Market Investigation

When market investigations are not conducted properly, it is possible that some potential alternatives will not be identified and investigated. Consequently, the best-value alternative might not be selected. If the best-value is not selected, the result will lead to greater program cost and/or time, the selection of substandard technology, or the least supportable material solution.

A good market investigation also would identify deficiencies in the commercial item that would require modification, and would determine the extent of that modification. Accurate determination of the necessary modifications is important; having to modify the selection more than anticipated would add both cost and time to the program. Extensive modification of commercial items within a program would take the product out of the category of a commercial item, thus increasing the program's risk.

Market investigation, along with concept formulation, is a key determiner of the acquisition strategy. If the market investigation is not performed properly, the selected acquisition strategy will probably not be the most effective and efficient one to use.

Key personnel within the buying organization must be adequately trained and experienced in the market investigation process. In the Natick Laboratory case of the snow and ice-traversing equipment, a proper market investigation would have headed off the problems with the selected off-the-shelf items prior to acquiring and testing them. In the case of the field pack, a market investigation would have identified the deficiencies with the commercial pack, which subsequently required modification to such an extent that it bore no resemblance to the original commercial pack.

7. Concept Formulation

Without an adequate concept formulation package, which includes both a tradeoff determination and the best technical approach, it is unlikely that the best alternative will be selected. This will cost the program both time and money, and possibly forego the best technology as well. Since concept formulation is one of the determiners of the acquisition

strategy, incorrect concept formulation is likely to lead to a substandard acquisition strategy. As the Army Audit Agency states: “The concept formulation process should be conducted and documented for nondevelopmental items.” [U.S. Army Audit Agency, pg. 23, 11 Sept 1990]

Even in cases where management directs the use of commercial items, there are always tradeoffs and options that need to be identified, analyzed and evaluated to establish the best strategy for implementation.

8. Risk Analysis

Program risk will be different when using commercial items than in a traditional developmental acquisition program. Risk is fairly well defined for commercial items in the traditional areas of technical performance, cost and scheduling. For example, the commercial item market investigation will determine cost and technical performance, and delivery dates are subject to negotiation and discussion. In the areas of integration, operational suitability and supportability, however, risk analysis should be strongly emphasized, not eliminated.

The risk that occurs during the integration of commercial parts must also be recognized, and program strategy to reduce or eliminate that risk should be established.

Commercial items that are to be used in a military environment significantly different from that for which they are designed carry high risk. These items must be qualified in the operational environment in which they will be used.

There is inherent supportability risk within the commercial realm due to the rapid change within the commercial marketplace, as previously discussed. This risk needs to be recognized and planned for in order to produce adequate total life-cycle support for the commercial item.

9. Design

The area of design cannot arbitrarily be rushed in order to speed up the program. Likewise, the use of commercial items does not necessarily mean that the design process has been reduced or streamlined. In fact, the incorporation of commercial items into a design may be more difficult, because all of the design parameters of the commercial

item may not be known. This is an area that demands careful analysis before attempting to compress design schedules.

10. Management of Integration

There is widespread misunderstanding of the complexity of commercial item and nondevelopmental item integration into a program. Integration projects cannot be treated as normal low-risk commercial item acquisitions. Such integration efforts may not only require research and development, but also may need both a demonstration and a full-scale development phase before production, unless the integration risk is determined to be sufficiently low.

11. Test and Evaluation

Test and Evaluation (T&E) must be included in the evaluation of both commercial items and nondevelopmental items to ensure that operational suitability, reliability, availability and maintainability requirements are met. Only for commercial off-the-shelf items that are very low risk should developmental T&E be allowed to be eliminated and operational testing should always confirm the suitability of a commercial item in the military environment. As the Army Audit Agency indicates, “More effective up-front planning of independent test and evaluation is needed to ensure that enough data is obtained to fully evaluate the capabilities of new nondevelopmental items.” [U.S. Army Audit Agency, pg 28, 11 Sept. 1990]

Testing should be performed on commercial items before and during production, unless a definitive decision verified by contractor data or previous tests adequately demonstrates the item’s acceptability. Sufficient data must be available to assess the critical testing issues of manpower and personnel integration, reliability, safety and supportability. Any decision to reduce or eliminate developmental testing should be based on independent evaluation reports that assess either the previous testing or other data to indicate how much testing will be required. A GAO study found that a DoD weapon system frequently “experiences ‘late cycle churn’ or the scramble to fix a significant problem discovered late in development.” [GAO, pg 5, 31 July 2000] This ‘late cycle churn’ is attributable to the inadequate exposure of technical problems early in the program via a robust test and evaluation process.

Operational testing of a commercial item in the military environment it will be used in order to verify operational suitability, effectiveness and performance should never be waived unless it will be used in the exact same environment for which it was designed.

12. Logistics Support

A significant problem concerning logistics support for commercial items has become apparent. Products are constantly being changed within the commercial item industry to keep contractors competitive. This constant change drastically affects the manufacturer support for older products. The manufacturer may no longer support older obsolete products, thus making replacement parts difficult, if not impossible, to obtain. As an Armed Forces Journal International magazine article puts it, “But today, the true cost of COTS is beginning to sink in. Sure, DoD’s R&D costs come down, but life-cycle costs under COTS need to substantially increase. Staying in step with the commercial world’s technology churn will require continuous mini-development efforts throughout a program’s life.” [Baker, pg4]

The process of streamlining for commercial items or nondevelopmental items can result in the elimination of the Engineering & Manufacturing Development (EMD) or System Development and Demonstration (SDD) phase, which would normally include detailed logistics planning and acquisition of the necessary logistics support infrastructure. This may result in not allowing enough time for the logistics planning process in order to adequately develop and acquire the support materiel package, maintenance structure, organizational and support training packages, and writing of technical manuals.

a. Reliability

If a commercial item’s reliability, as stated by the vendor, is not verified as meeting the user’s requirements, then the system’s LCC may be severely impacted. Lower reliability greatly impacts the support costs, system availability, and thus the mission accomplishment. RAM requirements must be established early in order to insure adequate testing and verification of the reliability of commercial or nondevelopmental items.

Since a commercial or nondevelopmental item has already been designed and developed, and its reliability already established, the reliability verification should be an operational assessment of the product within the military wartime environment in which it will be used.

b. Support Requirements

Because of the volatility of commercial items with respect to design changes, as previously mentioned, the availability of commercial item parts, components, or systems may cease before the intended military life-cycle of the commercial item expires. Therefore, support requirements must focus on the long-term maintenance and support of commercial items when fielded, because Government access to commercial item technical data will most likely be limited.

c. Technical Data for Competitive Reprocurement

Plans for access to data suitable for competitive reprocurement of commercial items are critical. Obsolescence within the commercial item marketplace is usually more rapid and unpredictable than it is for products developed specifically for the Government. The commercial item marketplace is more volatile; products can be dropped abruptly, or changed and businesses can go bankrupt or be bought out by other companies. Without adequate planning for reprocurement, it is assured that there will be trouble within the program - and sooner than anyone might think.

C. COMMERCIAL ITEM SUMMARY

The inclusion of commercial items in the acquisition process is recognized as an opportunity to save both time and money. But it is not the Holy Grail. It can do all that everyone expects it to do, and may be an excellent solution in many cases, but its use should be as the result of careful analysis, reasoning and multi-functional study. As Carney and Oberndorf indicate in their research paper on the use of COTS to purchase software, "The critical point is that using COTS components in any given circumstance might help, but is not guaranteed to, and such use may even cause greater problems." [pg. 1] They propose what they call the "ten commandments," which must be considered when using COTS. All of these "commandments" apply directly to the use of commercial items other than software.

For example, their first commandment, “One more time: Do not believe in Silver Bullets” [pg. 3] applies to this study, also. This has been reiterated in several contexts involving software, and certainly applies to the use of commercial item equipment in programs, as well. Anyone who believes that selection of a commercial item and inserting it into a program will be the quick fix believes in fairy tales, and does not really understand the process.

The second commandment, “Use the term precisely (and demand like behavior from others)” [pg. 3] most certainly applies here. We have noted in this research that terms have been used differently in the past in the Army Audit Agency reports, and that Dr. Gansler specifically defined terms in order to bring uniformity to the terminology.

Their third commandment, “Understand the impact of COTS products on the requirements and selection process” [pg. 4] equally applies to this research. It is important that commercial products are known and understood by those who establish requirements. The commercial marketplace must be clearly understood in order to have a flexible range of “requirements” sufficient to allow commercial items to qualify.

The fourth commandment, “Understand the impact of COTS products on the integration process,” [pg. 5] certainly applies, as demonstrated by the various integration problems that have occurred within the various services and subsequently reported in the previously cited audits. There has been a tendency to assume that a commercial item can be used as-is, without any serious thought given to the difficulty and risk involved in the integration process. It has been assumed that the use of a commercial item alleviates all risk of integration. In fact, just the opposite may occur: commercial items may be even more difficult to integrate.

Their fifth commandment, “Understand their impact on the testing process,” [pg. 6] also applies, as has been demonstrated by the problems experienced in commercial item testing. The validation of commercial items is different from the testing of development projects. This difference in the testing process must be clearly understood in order for validation of the commercial item to be correctly planned. Testing must then

be initiated early enough in the process in order to alleviate the great risk that occurs when it is performed too late.

Their sixth commandment, “Realize that a COTS approach makes a system dependent on the COTS vendors,” [pg. 6] was exemplified in the Army Audit Agency report of 11 September 1990. This report found that in most cases, for the sake of expediency, PMs opted for the end-item contractor to provide the maintenance and supply support for the product. Vendor support must be examined critically for several reasons. First, it’s important to insure that the program doesn’t become too dependent on the vendor. Second, it must be determined that the vendor has sufficient technical data for adequate ongoing support. Third, it must be determined that the vendor has sufficient technical data for reprourement of the product. Reprourement is high-risk, made so by the probability that the commercial item vendor may change the product, or the product support, go out of business, be bought out by another company, etc. Contingency plans should therefore be developed for these possibilities.

Their seventh commandment, “Realize that maintenance is not free,” [pg. 7] is exemplified by the Army Audit Agency 11 September 1990 report about the blind faith exhibited by the PMO concerning the cost effective vendor support of their products. This audit report has documented one of many instances where no analysis was performed to prove that contractor support was more cost-effective than the use of the military in-house organic support system.

The eight commandment, “You are not absolved of the need to engineer the system well,” [pg. 8] has been displayed in every one of the issues studied in the previous chapter. Just because a product may be an off-the-shelf commercial item, there is no guarantee that it will integrate into the program’s system successfully. Nothing will come together and work by itself. The integration process must not be accidental, but rather, must be planned and executed purposefully. As has been seen in the previous problems in Chapter III, commercial items add another whole dimension to the difficulty of program management. Elimination of systems engineering in the commercial item acquisition process is not an option with the use of commercial items. As Carney notes, “This system will need to be designed, brought together, tested, and managed just the same as any

other system you have built or acquired in the past.” [pg 8] Logistics supportability planning and execution should be added to Carney’s list.

Their ninth commandment, “Just ‘doing COTS’ is not an automatic cost-saver,” [pg 8] has been alluded to throughout this thesis. There has been a lot of anecdotal evidence, as well as a few actual cases to substantiate the claim that use of commercial items saves both time and money. However, it is not a “given” that using a commercial item will always save time or money. The use of commercial items must be carefully planned, well engineered, and analyzed in depth.

The tenth commandment, “Just ‘doing COTS’ must be part of a large-scale paradigm shift,” [pg. 9] was indicated in Chapter II, paragraph H, sections 1-7, of this thesis. Instead of the Traditional Model, as shown in Figure 2 of this thesis as being a waterfall acquisition process, it is now imperative that processes overlap and that greater use of IPTs be made in order to manage the uniqueness of commercial item usage, as portrayed in the Recommended Process – Figure 2.

D. COMMERCIAL ITEM BEST PRACTICE SUMMARY

The following table summarizes the problem/issue as a “risk,” the possible cause of the unresolved risk, and the best practice to follow to minimize the risk.

Table 3 Commercial Item Best Practice Matrix

| RISK | POSSIBLE CAUSE | BEST PRACTICE |
|--|--|--|
| <p><u>Needs Determination</u></p> <ul style="list-style-type: none"> - User requirements are improperly identified, misunderstood or ignored. - Requirements allowed to grow, i.e., requirements are gold plated. | <ul style="list-style-type: none"> - Inadequate acquisition planning/risk analysis performed; inadequate training/education; unclear ORD; IPTs not used; culture-driven decisions; no product standardization; no centralized database; inflexible reqmts. -No acquisition planning/IPT; needs allowed to grow too easily; inadequate ORD; insufficient market research. | <ul style="list-style-type: none"> - Use IPTs; clearly written ORD; comprehensive acquisition planning; thorough market research; adequate acquisition training and education; use lessons learned. - Use IPTs; clearly written ORD; comprehensive acquisition planning; thorough market research; freeze requirements or use P³I process to add needs. |
| <p><u>Acquisition Strategy</u></p> <ul style="list-style-type: none"> - Incorrect streamlining acquisition strategy used. | <ul style="list-style-type: none"> - Lessons learned not utilized; no evaluation of streamlining decisions; inadequate training/education; incorrect culture-driven decisions. | <ul style="list-style-type: none"> - Utilize lessons learned, closely evaluate streamlining decisions; provide adequate acquisition training and education; need comprehensive review of & change of culture paradigm. |
| <p><u>Market Investigations</u></p> <ul style="list-style-type: none"> - Inadequate or no market investigation performed. | <ul style="list-style-type: none"> - No early, robust, market investigation performed; inadequate training/education; no centralized database/lessons learned. | <ul style="list-style-type: none"> - Perform robust market investigation early in the acquisition process; adequately trained personnel; use centralized database + lessons learned. |
| <p><u>Concept Formulation</u></p> <ul style="list-style-type: none"> - Inadequate or no concept formulation package prepared. | <ul style="list-style-type: none"> - Inadequate training/education/ or lessons learned; incorrect culture-driven decisions. | <ul style="list-style-type: none"> -Use lessons learned; adequately trained and educated personnel; need comprehensive review of & change of culture paradigm. |

*Table 3 (continued)**Commercial Item Best Practice Matrix*

| RISK | POSSIBLE CAUSE | BEST PRACTICE |
|--|--|--|
| <u>Risk Analysis</u> - A risk analysis was not performed. | - No early, robust, market investigation performed; inadequate training / education / or use of lessons learned; widespread misunderstanding of the complexity of integration. | - Perform robust market investigation early in the systems acquisition process; adequate acquisition training and education; centralized database / use lessons learned. |
| <u>Manage Integration</u> - Inaccurate assessment of program integration risk. | - No early, robust, market investigation performed; inadequate training / education / or use of lessons learned; widespread misunderstanding of the complexity of integration. | - Perform robust market investigation early in the systems acquisition process; adequately trained and educated personnel; centralized database / use lessons learned. |
| <u>Test & Evaluation</u> - Testing was inadequate or was not performed. | - Culture-driven poor decisions; inadequate training / education / or use of lessons learned; lack of funding; lack of resources. | - Change the culture's paradigm; adequately train and educate personnel; create centralized database / use lessons learned. |
| <u>Design</u> - The design was underestimated. - The design process was incorrectly accelerated. | - Inadequate training / education / or use of lessons learned; culture-driven poor decision. - Culture-driven; inadequate training/education/use of lessons learned. | - Change the culture's paradigm; adequately train and educate personnel; create centralized database / use lessons learned. |
| <u>Reliability</u> - The program reliability was inadequate. - No quantitative reliability requirements established. - Contractor's reliability estimates not verified. - Inadequate reliability testing prior to contract award. | - Poor culture-driven decisions; inadequate training / education / use of lessons learned, lack of funding. | - Change the culture's paradigm; adequately train and educate personnel; create centralized database / use lessons learned. |

*Table 3 (continued)**Commercial Item Best Practice Matrix*

| RISK | POSSIBLE CAUSE | BEST PRACTICE |
|--|---|---|
| <u>Support Requirements</u> - Incorrect program support concept is selected. - Inadequate logistics support is planned. | - Poor culture-driven decisions; inadequate training / education / use of lessons learned; misunderstanding of the schedule needed for logistics even for CI/NDI items. - Insufficient time allotted for logistics support planning / preparation; EMD phase eliminated. | - Change culture's paradigm; adequately train and educate personnel; create centralized database / use lessons learned. - Stretch phase to accommodate logistics support planning such as TMs, training, provisioning. |
| <u>Tech Data - Competitive Reprourement</u> - Data adequate for reprourement is not obtained. | - Poor culture-driven decisions; inadequate training / education / use of lessons learned. | - Change culture's paradigm; adequately train and educate personnel; create centralized database / use lessons learned |

E. CONCLUSION

In order to reduce the time and cost of fielding new systems and inserting new technologies rapidly, the well thought out use of commercial items is imperative. However, the difficult new paradigm of using commercial items must be recognized, and acquisition personnel educated and trained for its efficient and effective use. The previous table of best practices is provided in order to highlight the major areas of risk that have been found to exist within the acquisition community. It also summarizes the best practices that will serve to minimize those risks.

F. AREAS FOR FURTHER RESEARCH

This thesis identified areas that merit additional research, but did not address them because they were beyond the scope of this study. Those areas are as follows:

1. An in-depth analysis of the cost-benefit relationship of using commercial items in acquisition programs.
2. An examination of any existing barriers to using commercial items more efficiently in DoD acquisition programs.
3. A comparative analysis of the problems associated with using commercial items versus the problems found in traditional acquisition programs to determine the significant differences, if any.
4. An analysis of major defense acquisition programs' potential of meeting the OSD commercial item goals that have been set for DoD.
5. Identification of the extent the current PM community acquisition culture affects the PM's correct usage of commercial items, the extent to which it contributes to the problems, and recommended corrective actions.
6. Identification, via survey or other means, of the extent to which the "culture" in which the PM is immersed drives incorrect or inadequate decisions within the acquisition process and potential corrective actions.

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LIST OF REFERENCES

Air Force Space and Missile Command. CPATs – Reliability Engineering, 14 August 1998. Military Specifications and Standards Reform Program (MSSRP), Critical Process Assessment Tool (CPAT), SMC/AXM. Retrieved 16 October 2001 from the World Wide Web: <http://web2.deskbook.osd.mil/data/012GZDOC.DOC>.

Anderson, Robert H. and Hundley, Richard O. *The Implications of COTS Vulnerabilities for the DoD and Critical U.S. Infrastructures: What Can/Should the DoD Do?*. RAND. 1998.

ASAAL&T. Acting Assistant Secretary of the Army for Acquisition, Logistics and Technology. Memorandum Subject Commercial Acquisitions. 26 March 2001.

Baker, Don. *Commercial Off-The-Shelf*. Armed Forces Journal International. November, 1997. Retrieved 21 July 2001 from the World Wide Web: <http://www.afji.com/mags/1997/Nov/Feature1.html>.

Bonheim, Mike LTC. PM – Physical Security Equipment. *Commercial Items Acquisition Data Call S: COB 22 February 2001*.

Brinkley, C. Mark. *We Need to Lie*. Marine Corps Times, pgs 8-10. 29 January 2001.

Carney, D. and Oberndorf, P. *OSD - Commandments of COTS: Still in Search of the Promised Land*. Software Engineering Institute, Carnegie Mellon University. Retrieved 4 September 2001 from the World Wide Web: <http://www.deskbook.osd.mil/irp/253.asp - MandRef>.

CJCS. Chairman of the Joint Chiefs of Staff Instruction 5261.01A. 1 August 1998. Retrieved 24 September 2001 from the World Wide Web: <http://www.datashopper.dk/~boo/comterfund.html>.

Defense Systems Management College. *Systems Engineering Management Guide*. DSMC, Ft. Belvoir, VA. January 1990. pg 13-1

DoD. DoDD 5000.1. *The Defense Acquisition System*, paragraph 4.2.3, (Incorporating Change 1, 4 January 2001) 23 October 2000. Retrieved 20 August 2001 from the World Wide Web: <http://web2.deskbook.osd.mil/reflib/MDOD/061DD/061DDDOC.HTM#T2>.

DoD. DoDI 5000.2. Operation of the Defense Acquisition System; (Including Change 1); 4 January 2001. Retrieved 23 August 2001 from the World Wide Web: http://web1.deskbook.osd.mil/htmlfiles/rframe/REFLIB_Frame.asp?TOC=/htmlfiles/TOC/012ditoc.htm&Doc=/reflib/mdod/012di/012didoc.htm&BMK=T19.

DoD IG. Department of Defense Inspector General. *Allegations Involving the Procurement of the Hunter Unmanned Aerial Vehicle: Short-Range System*. Report No. 96-111. 7 May 1996. Retrieved 26 September 2001 from the World Wide Web: <http://www.dodig.osd.mil/audit/reports/96report.htm>.

DoD IG. Department of Defense Inspector General. DoD Hotline Allegation Regarding the Naval Special Warfare Patrol Coastal Ship and Rigid Inflatable Boat Acquisition Programs. Report 95-193. 15 May 1995.

DoD IG. Department of Defense Inspector General. *Effectiveness of DoD Use of Nondevelopmental Items in Major Defense Acquisition Programs*. Report No. 92-107. 22 June 1992. Retrieved 26 September 2001 from the World Wide Web: <http://www.dodig.osd.mil/audit/reports/92report.htm>.

DoD IG. Department of Defense Inspector General. *Lessons Learned from Acquisitions of Modified Commercial Items and Nondevelopmental Items*. Report No. 97-219. 23 September 1997.

DoD. Deputy Under Secretary of Defense (Acquisition Reform). Draft *Commercial Item Handbook*. 10 January 2001. Retrieved 15 August 2001 from the World Wide Web: http://www.acq.osd.mil/cgi-bin/web_evaluate?dataset=ar&db=ar&multi=1&query=Commercial+Item+Policy&searchButton=Search.

DoD. Office of the Deputy Under Secretary of Defense for Acquisition Reform. *Commercial Item Acquisition: Considerations and Lessons Learned*. 14 July 2000.

DoD. Under Secretary of Defense for Acquisition and Technology. *Buying Commercial & NonDevelopmental Items: A Handbook*. April 1996.

DoD. Under Secretary of Defense for Acquisition, Technology and Logistics. Dr. J. S. Gansler. *Policy Memorandum: Commercial Acquisition*. 5 January 2001.

Federal Acquisition Regulation Parts 2 and 12, (25 June 2001). Retrieved 15 August 2001 from the World Wide Web: <http://www.arnet.gov/far/loadmain.html>.

Federal Acquisition Reform Act. Title 10. Section 2304 of Public Law 104-121. 1996.

Federal Acquisition Streamlining Act. Title 10. Section 8104, paragraph 2377 of Public Law 103-355. 1994.

Flack, Marla. AMSEL-LG-CM. *Impact of DA Policy on Commercial Items*. Information Paper. 18 May 2001.

General Accounting Office. GAO/NSIAD-00-199. *Best Practices: A More Constructive Test Approach Is Key*. 31 July 2000. Retrieved 30 July 2001 from the World Wide Web: <http://www.gao.gov/>.

General Accounting Office. GAO/NSIAD-95-161. *UNMANNED AERIAL VEHICLES: Maneuver System Schedule Includes Unnecessary Risk*. September 1995. Retrieved 25 September 2001 from the World Wide Web: <http://www.gao.gov/>.

General Accounting Office. GAO/NSIAD-96-2, *Unmanned Aerial Vehicles: Hunter System Is Not Appropriate for Navy Fleet Use*. 1 December 1995. Retrieved 25 September 2001 from the World Wide Web: <http://www.gao.gov/>.

Kang, Keebom. *DoD Inventory Management Culture Changes and Training in Commercial Practices*. Research paper NPS-SM-98-002. March 1998.

U.S. Army Audit Agency. *Acquisition of Nondevelopmental Items U.S. Army Natick Research, Development and Engineering Center Natick, Massachusetts*. (Report of Audit NE 90-206). 19 March 1990.

U.S. Army Audit Agency. *Acquisition of Nondevelopmental Items*. (Report of Audit NE 91-204). 17 June 1991.

U.S. Army Audit Agency. *Acquisition of Nondevelopmental Items, Fort Monmouth, New Jersey*. (Report of Audit NE 90-209). 11 September 1990.

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BIBLIOGRAPHY

DoD IG. Department of Defense Inspector General. *Contractor's Performance on the Family of Medium Tactical Vehicles Program*. Report 96-020. November 1995.

DoD IG. Department of Defense Inspector General. *Purchasing Commercial Products*. Report 97-145. May 1997.

DoDR 5000.2. Department of Defense Regulation. *Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information System (MAIS) Acquisition Programs*. DoD Deskbook, 10 June 2001.

DoN. Department of the Navy. *NAVSEA -- Acquisition Planning Guide*. December 1999.

GAO. General Accounting Office. *ACQUISITION REFORM - The Government's Market Research Efforts*. GAO/NSIAD-97-3. October 1996.

GAO. General Accounting Office. *ACQUISITION REFORM - Military-Commercial Pilot Program Offers Benefits but Faces Challenges*, Government Accounting Office. GAO/NSIAD-96-53. June 1996.

GAO. General Accounting Office. *ARMY ACQUISITION - Medium Trucks Passed Key Operational and Technical Tests*, Government Accounting Office. GAO/NSIAD-96-4. January 1996.

Oberndorf, Tricia, Brownsword, Lisa and Sledge, Carol A. *An Activity Framework for COTS-Based Systems*. Technical Report CMU/SEI-2000-TR-010. Carnegie Mellon University. October 2000.

Oberndorf, Tricia. *COTS-Based Systems (CBS) Initiative*. Carnegie Mellon University. Retrieved 23 August 2001 from the World Wide Web:
http://www.sei.cmu.edu/cbs/cbs_description.html.

USAAA. U.S. Army Audit Agency. *Acquisition of Nondevelopmental Items – Program Executive Officer, Combat Support and U.S. Army Tank-Automotive Command, Warren, Michigan*, Report No. EC-90-211, 21 August 1990.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-----------|--|
| ASA(AT&L) | Assistant Secretary of the Army for Acquisition Technology and Logistics |
| CI | Commercial Item |
| CINC | Commander in Chief of a Unified Command |
| CNO | Chief of Naval Operations |
| COTS | Commercial Off-The-Shelf |
| DoD | Department of Defense |
| DoDD | Department of Defense Directive |
| DoDI | Department of Defense Instruction |
| DoDR | Department of Defense Regulation |
| DT | Developmental Test |
| DT&E | Developmental Test & Evaluation |
| DUSD(AR) | Deputy Under Secretary of Defense for Acquisition Reform |
| EMD | Engineering & Manufacturing Development |
| FAR | Federal Acquisition Regulation |
| FASA | Federal Acquisition Streamlining Act |
| GOTS | Government Off-the-Shelf |
| GSA | General Services Administration |
| GSS | General Ships Specifications |
| HQAMC | Headquarters of the Army Material Command |
| IFB | Invitation for Bid |
| IPPD | Integrated Product and Process Development |
| IPT | Integrated Process Team |
| LCC | Life Cycle Cost |
| LRIP | Low-Rate Initial Production |
| MIL-SPEC | Military Specification |
| MOA/MOU | Memorandum of Agreement/Understanding |
| NDI | Nondevelopmental Item |
| NSSC | Naval Sea Systems Command |

| | |
|------------------|--|
| NSWC | Naval Surface Warfare Center |
| ORD | Operational Requirements Document |
| OT | Operational Test |
| OT&E | Operational Test & Evaluation |
| PEO | Program Executive Officer |
| PM | Program Manager |
| P ³ I | Preplanned Product Improvement |
| R&D | Research and Development |
| RDT&E | Research, Development, Test & Evaluation |
| RFP | Request for Proposal |
| RFQ | Request for Quotation |
| RIB | Rigid Inflatable Boat |
| R&M | Reliability and Maintainability |
| SDD | System Development and Demonstration |
| T&E | Test and Evaluation |
| USAAA | U.S. Army Audit Agency |
| USC | United States Code |
| USD(AT&L) | Under Secretary of Defense for Acquisition, Technology and Logistics |
| UL | Underwriters Laboratory |

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